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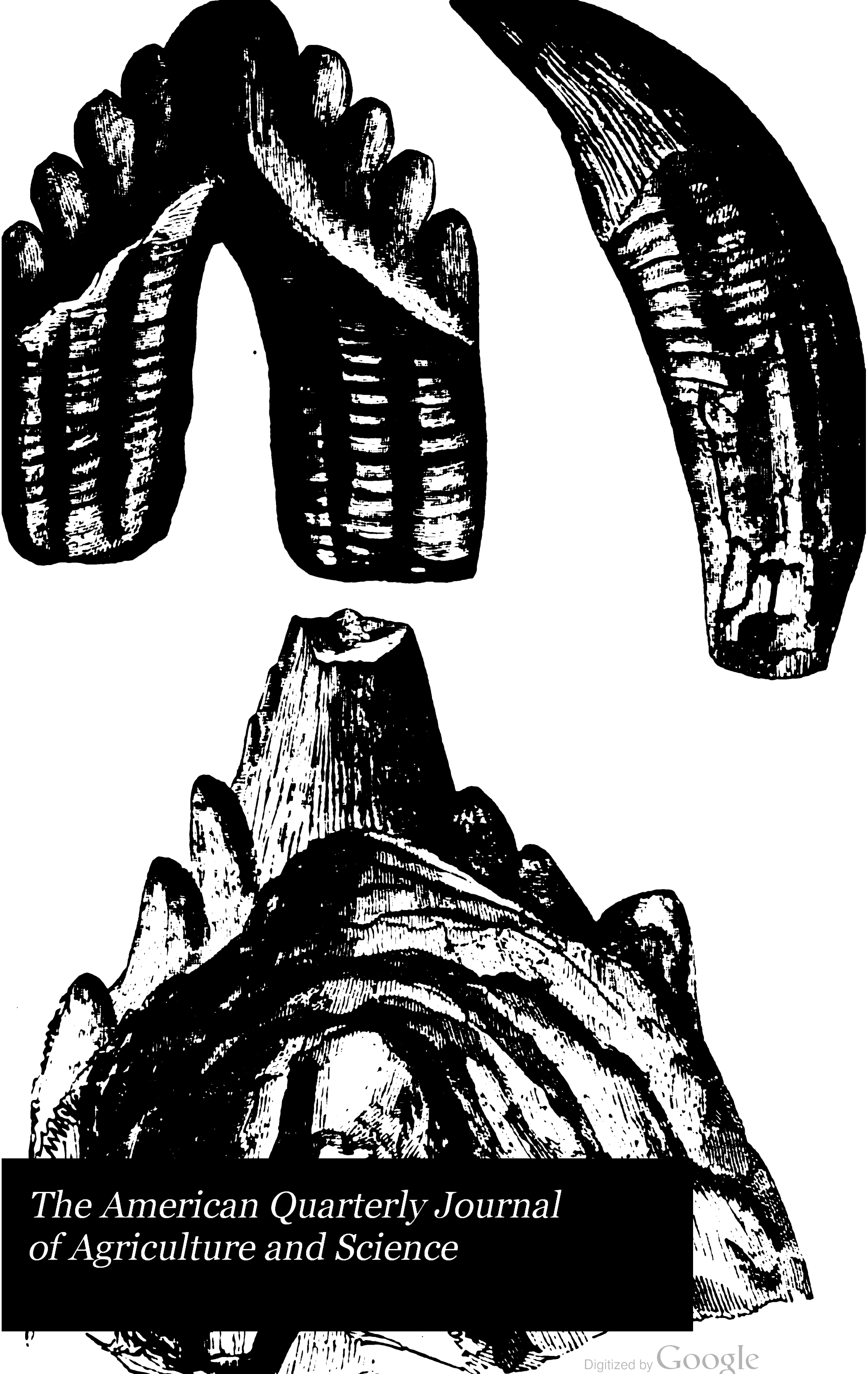

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The Gift of
Prof. Asa Gray, M.D.,
of Harv. Univ.
Rec. Nov. 20,
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CONDUCTED BY

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VOLUME II.

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TO OUR PATRONS.

We take this opportunity to inform our Patrons that our year is completed with this number. We hope the Journal has been conducted so as to satisfy the majority of our readers. We have received many flattering expressions of regard for it. We shall continue it another year on the same plan, and with increased efforts to make it what the farmer needs. We shall be gratified if most of our present subscribers make up their minds to patronize us the next year: if so, they may, if they please, forward their subscriptions as early as convenient, say by the middle of December. If they do not patronize the work, we shall esteem them just as well. Whenever we find it is not wanted by a sufficient number to support it, we shall stop it short at the close of the year; for we have something else to do than to beg for its life, and it shall not, while in our hands, be suffered to taper off to the little end of a pipe stem. We seriously contemplated reducing its price to two dollars, but found we could not, and furnish such illustrations as the work demands. For further information, we refer to the Prospectus. We would also call attention to a new arrangement commencing with the present number, namely, the introduction of a division termed "Spirit of the Monthlies;" under which we propose to make regular selections from the various agricultural periodicals, whereby our subscribers will be furnished with much that is useful and interesting, and which they could not obtain otherwise than by greatly extending their subscription lists.

A. J. PRIME.

Albany, October 20, 1845.

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TO OUR READERS.

Under the new Rates of Postage, this Journal will be charged, to those who receive it by mail, by the ounce, and by this means will amount to no more than the postage on a weekly newspaper. The Postmaster General has made provision for transmitting money to Editors, but we will not trouble the department with our business. Subscribers will oblige us by transmitting their subscriptions to us by mail and we will pay the postage.

We have been gratified with the expressions of unqualified approbation with which the Journal has been received thus far, and no effort will be wanting on the part of the Editors to sustain its character, and make it the first Agricultural Journal in this country. And we would ask the efforts of our friends to add to our list of subscribers. We have not yet undertaken to praise ourselves, but we might cite a large amount of recommendations, both from individuals and from the public press. Still it is our wish to stand upon the actual merits of the Journal, and of these our readers will judge. We think it will recommend itself to every intelligent agriculturist. By that class of farmers who are already too wise to learn, we do not expect to be read.

We are requested to notice the following errors in our last number: Page 284, 18th line, and page 287, 9th line, for *trimming* read *thinning*.

Page 302, 23d line, for *rot* read *root*.

Downing's "Fruits and Fruit Trees of America," was received too late for notice.

Some obscurity seems to exist in the explanation of the drawings on page 86. A millimeter is about $\frac{1}{25}$ of an inch. The divisions of the attached scale represent hundredth parts of a millimeter—each division, consequently, is equal to $\frac{1}{2500}$ of an inch. By applying this scale, therefore, to the drawings, the exact degree of fineness may be seen.

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AMERICAN

QUARTERLY JOURNAL

OF

AGRICULTURE AND SCIENCE.

Vol. II. JULY, 1845. No. 1.

AGRICULTURAL GEOLOGY.

General observations on the soils derived from the decomposition of different rocks. Classification of rocks. Analysis of simple minerals: felspar and albite; labradorite; hornblende; hypersthene; serpentine; basalt and greenstone. Drifted soils.

§1. SOILS DERIVED FROM THE DECOMPOSITION OF DIFFERENT ROCKS.

In the pursuit of an important object, it is wise and proper to avail ourselves of all the aids within our reach to secure its attainment; and it is an imperious duty so to do, when the object to be obtained is surrounded with difficulties, and where every ray of light is wanted to illuminate dark and obscure points. Upon agriculture all the modern sciences send their lights, some more and some less; all, however, impart something, and lend their aid to its promotion. In this office geology is behind none other, unless it be chemistry, whose range is not only great, but minute, affecting every and all departments. A great many facts, strictly geological, have an important bearing upon the subject before us; such as the nature of the rock, its structure and position, its composition, its relations to moisture, and liability to solution. The position of the rocks of a district, as will be seen in the sequel, is always an important point, and in some cases all that is essentially requisite; for it often adds value to their possession, even when they cannot be turned to account directly in the cultivation of the soil.

Under the influence of these considerations, and others of minor importance, which it is unnecessary to state, I propose to give first of all a recapitulation of the geology of New-York, with a view of applying all the facts which bear upon agriculture to its illustration. For the convenience of description, I shall pursue the plan adopted in the geological reports, namely, that of describing the rocks in the ascending order; and this will lead me to speak of them in the order of the districts which I have already briefly described, and into which the state has been divided.*

The six districts coinciding nearly with six groups of rocks, each of these groups respectively imparts to the overlying soil some of its distinguishing characters, or in a good measure makes it what it is. Modifying influences, however, independent of the geological formation, have done something as diluvial or transporting agents, by which soils originating and formed at a distance have been brought to and distributed over adjacent districts. Still it will be found on examination that the underlying rocks have given a stronger character to the soft materials than has usually been supposed, leaving out of view some areas in every district where drift has lodged in deep beds.

In estimating the amount of soil furnished by groups of rocks, we are necessarily obliged to observe the nature of the masses. Many of the shales and slates, and they occur in almost every group, disintegrate rapidly, the action being favored both by water and frost: the first, penetrating between the laminæ, partially separates them; and in some instances no other agent is required to effect an entire destruction of a stratum, especially where wetting and drying alternately occur. In other cases, the assistance of frost is required to effect a complete reduction of the strata to soil.

Limestones are liable to a constant loss of material by solvent properties of rain water, which holds carbonic acid in solution; and this operation is favored by a rough or uneven surface, where the water stands for a time. On a polished surface, the action of water and other agents is very slow and inconsiderable even after the lapse of several years, as is proved by the durability of the marbles used in the construction of monuments, and by that of other rocks when carefully smoothed; whereas upon the exposed surfaces of quarries, the sloping sides are often deeply grooved by the water which slowly trickles over their surfaces.

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* See article Temperature, No. 2, vol. I.

Granite and gneiss disintegrate and decompose from their peculiar chemical composition, and the presence of alkalies in the felspar and mica exert a powerful influence in these changes. High granitic peaks in the region of frosts undergo a rapid decay, and in consequence furnish upon the slopes and in the valleys beneath, their peculiar soils, which are well adapted to grass and grain. The alkalies in these rocks, if completely insulated, would pass off rapidly through the soft materials, and be lost to vegetation. They are, however, so combined with silica, that they are comparatively unaffected by the common solvent, water, and hence are retained in the soil for the use of plants.

Other kinds of rocks liable to decay, are the siliceous limestones, one of which is the calciferous sandstone. It appears from examination that the lime is dissolved out, leaving upon the surface the silex in grains, which falls off by its own weight, or else is rubbed off by friction. The dissolved lime, however, does not all pass into and remain in the soil, but is carried down, and forms very frequently with other materials a *hardpan*, a puddingstone, or concretions, the lime acting as a cement; in other instances it percolates into and through the rock, and forms stalactites, veins or other deposits. The same action or power which dissolves the carbonate of lime in solid rocks, dissolves also that which may be diffused through the soil. This takes place where the surface is frequently stirred, as in cultivated fields. Thus this element is removed both by vegetation and by the ordinary action of rain water, and hence its deficiency in most of the soils of New-York and New-England.

§ 2. CLASSIFICATION OF ROCKS.

The classification of rocks has been a most perplexing study to geologists. They have not disagreed, however, so much as to the planes where lines of separation should be drawn, as in the designation of the masses. The ancient names, *primitive*, *transition* and *secondary*, have all been objected to, and have been abandoned by many of the European writers. In consequence of this, others have been proposed as substitutes, and have been adopted in part; but the proposed names are about as objectionable as the old ones, and hence much hesitancy has been manifested in their adoption. Without attempting to decide which nomenclature is best, I shall use that which the public is most familiar with.

The word *primary* is a term whose meaning is well fixed in this country, being applied to those masses which were consolidated before the creation of organic bodies. This term, then, will be used to designate a class whose existence was anterior to that of organic beings. It is true that some masses belonging to this class have been in a liquid or fused state since the existence of organic bodies; still, so far as observation extends, the great mass or crust of the earth is made up of granite, gneiss, mica slate, hornblende, serpentine and primary limestone; and doubtless these masses were consolidated anterior to the period spoken of.

The word *sedimentary* is another term, the meaning of which cannot be misunderstood or misapplied. It will be used to designate those masses which are really consolidated sediments. It will often be used as synonymous with the word *stratified*, inasmuch as all sediments are disposed to arrange themselves in layers or strata. The materials in this case lie in parallel beds, varying greatly in thickness; all, however, separable from each other through the planes of deposition, each of which may be distinguished by lines upon the faces of a ledge, by some diversity in the materials, or difference in the colors of two adjacent beds. Other lines, however, appear both upon the ends or surfaces of beds, which are not indicative of bedding planes. Thus, when we find regular forms as rhomboids marked upon rocks, they are not to be taken at all as the result of deposition. No difference of materials or difference of color can be discerned along these lines. Such regular forms are therefore the effects of crystalization. In some masses, however, both kinds of planes may be found. If the beds are horizontal, the upper and lower planes are those of deposition; but they may lie in any other direction, as the vertical, or oblique in various degrees. The other lines course along upon the planes of deposition, and produce rhomboids or other mathematical forms. In other cases, again, *all* the planes are the effects of crystalization. Those which appear in granite, in trap, serpentine and primary limestone, are never planes of deposition. The forms which these rocks give us are more obtuse than those in slates and shales; they are frequently nearly square blocks. All these planes serve an important purpose; and though they are really produced by the operation of a constant law in the inorganic world, yet they bear the impress of design: they facilitate the dissolution of the mass, and by that means assist in preserving a due balance in matters above and below water; they are highly important as a means of separating and raising the layers from their beds, and thus aid in quarrying. Without them, it would be impossible to raise stones for flagging, and for a variety of other useful purposes.

The first great division of rocks, then, is into *Primary* and *Sedimentary*. The former are divided into two kinds: those which are *massive*, or destitute of planes analogous to planes of deposition, as granite; and those which are *stratified*, as gneiss, mica slate, etc.

It is proper, however, to observe in this place, that all rocks divide by different kinds of planes. Those which are not the planes of deposition, are termed *joints*; and hence a rock is said to be jointed, when planes exist in a direction different from that of the planes of deposition.

Sedimentary rocks are subdivided into several systems. By the term *system*, is meant a series of rocks formed and deposited in the course of a single period or era, during which nearly the same orders of organic beings existed; each system being marked, both at its coming in and going out, by some great change in the condition of things. The outgoing and the incoming of a system is indicated by changes in the sediments, in their position, and in the character of the organic beings of the time and place. It will be conceived, then, that the lines of demarcation between systems are the most important of all. The most instructive study is that of the diversity of these systems; as from it we learn the history of the earth, its revolutions and changes. We are not, however, to receive all the doctrines which are advanced in relation to changes and revolutions as fully proved. At the time when organic beings first existed, certain essentials in organization were necessary. A physical system was then established, and to this system organic beings were to be adapted. There were controlling agents. Of these, the atmosphere was one, and caloric another; and these have continued and will continue to control the types of organization to the end of time. Vary the present standard, if only in a narrow compass, and but few if any of the present races would continue to exist.

In view of this subject, I hazard the assertion that the composition of the atmosphere was never essentially different since the *Nereites* of the Taconic system were created; and also that the temperature has never been greater than it is now, since that period. This is going back as far as it is possible with organic beings; none older are now known to exist. Because a lizard or crocodile does not consume so much oxygen as an ox in a given period, it does not follow that in the era of the Lias, an era of lizards, the atmosphere contained less oxygen or more carbonic acid than it does now; for with their respiratory apparatus, we have a right to infer that if the proportion of oxygen was less than it is at present, they would not be supplied with that material, and enough could not be obtained if less existed in the atmosphere. When we speak, therefore, of the changes which usher in a new system, it is not intended to inculcate the doctrine that they were so great, or of such a character, as would be incompatible with the present; or that organic beings would be unfitted organically for any other period or era in the world's history.

Systems are subdivided into groups; the groups holding the same relation to a system, as the system to the totality of the consolidated sediments. The beginning and end of a group is marked by some important change, such as the disappearance of affiliated tribes and species. It is then by observations of this kind, that divisions and subdivisions of the sediments are obtained. Names which are supposed to be appropriate at the time, are conferred upon the systems and groups. They may subsequently, however, be demonstrated to be inappropriate; the progress of discovery outgrowing and thereby rendering obsolete the nomenclature. This is an evil; and one who is disposed to cavil, might lay hold of the fact to the prejudice of the science of geology, on the ground that nothing is settled; that it is a subject of opinions and speculations, and not of facts and principles; of endless details and fanciful hypotheses, which every man has a right to invent for his own or his neighbor's amusement. But such cavilers belong to a race too lazy to observe, too self-conceited to profit by facts, or too bigoted to look at truth when they fear it may conflict with their own notions. They are too obstinate to be reformed; and if they were reformed, they would be of little use to science in any of its departments.

The primary rocks, comprehending granite, hypersthene, primary limestone, serpentine, gneiss, mica and talcose slates, hornblende, sienite, trap and greenstone, require our attention first of all. They may be tabulated as follows:

PRIMARY.	IGNEOUS	Granite	Composed of quartz, felspar and mica.
		Hypersthene rock.	
		Primary limestone.	
		Serpentine.	
	PLUTONIC	Greenstone and trap.	
		Basalt.	
		Lavas	
	STRATIFIED	Gneiss	Composed of quartz, felspar and mica.
		Mica slate	Quartz and mica.
		Talcose slate.	Quartz and talc.
		Hornblende	Simple.
		Sienite	Composed of hornblende and felspar.

Those portions of the state over which primary rocks prevail, are the northern and southern highlands. Most of the masses enumerated above are found in both these districts. In the northern, which is by far the largest and most important primary district, that peculiar variety of granite denominated *hypersthene rock* prevails very extensively: it forms the highest parts of the county of Essex. Surrounding this mass as an irregular zone, are beds of granite, primary limestone, and a granitic gneiss. This immense mass forms a large portion of the great triangle north of the Mohawk valley. It is here that our granitic soils are formed. The beds, however, of granite and other felspathic rocks which are disposed to decomposition are not very extensive. We have none of the sandy varieties of gneiss or mica slate, which become friable on exposure to the atmosphere, and crumble readily and rapidly into soil. Neither have we much of that peculiar granite which forms porcelain clay, or it is so limited that mere local effects are observed. Primary limestone, associated with granite, and even incorporated with it, exists also, but within such narrow limits that it is unnecessary to notice the peculiar soil which is thus jointly formed. The rocks on the highest parts of the Adirondacks disintegrate very rapidly, and form deposits on the side of these mountains, which in the progress of time find their way to the valleys.

In estimating the extent of granitic soil, and taking into account all the causes which act in distributing it over the state, I am led to adopt the opinion that it exists only in the immediate districts underlaid by the primary beds, in such quantity as to give the leading characters of a granitic soil. Diluvial action has undoubtedly swept over these districts, and carried to the south some of the soil which once rested upon the mountains and in their valleys, and it has intermingled with other soils more or less; still the quantity bears but a small proportion to that derived from sedimentary rocks. It is true that the materials of these rocks were in many instances of granitic origin, and it is easy often to discern undecomposed felspar in them. Notwithstanding all this, I am not ready to subscribe to the doctrine that all soils are essentially derived from one origin, and that a granitic one; for most of the alkalies are lost in the course of the changes to which the fine particles are subjected. No one, who has observed the soils of New-York, will hesitate to admit that the slate soils are quite different from those of the highland districts.

The same remarks might be made in regard to the Southern highlands. Granitic soil must be confined to the fields underlaid by primary rocks; those which contain felspar and mica, and which furnish by decomposition one or more of the alkalies or alkaline earths. Besides felspar, there are other minerals which are agriculturally important; thus, albite (another variety of the felspar family), mica and hornblende, are each important minerals to be known, or to be sought for in the rock, if we would learn approximately the composition of the soil of a primary district. Thus in Gouverneur and the neighboring towns in St. Lawrence county, a granite occurs, containing considerable albite. This substance contains soda in the place of potash; and hence we might expect this element in granitic soils, especially as this kind of granite is rather disposed to disintegrate.

§3. COMPOSITION OF SIMPLE MINERALS.

The composition of *felspar* and *albite*, together with that of some of the other more common rocks, it may be well to state in this place. The two first named consist respectively of

	FELSPAR.	ALBITE.
Silica,	65.21	69.09
Alumina,	18.13	19.22
Potash,	16.66	.....
Soda,	.....	11.69
	100.00	100.00

In attempting to distinguish these minerals from quartz, or flint as it is often called, we are to notice their hardness. Felspar and albite just scratch common window glass, but quartz does not. Albite is always white; felspar is white or flesh-colored, and each gives a strong reflection of light from the planes of the crystal; while quartz has the lustre of glass, or more of a vitrified appearance in the mass.

Another kind of felspar is the *labradorite*, which abounds in the rocks of the Adirondack mountains. The rock itself, as already stated, is termed *hypersthene rock*, from a small quantity of this mineral which it contains. The whole mass is mostly labradorite; and by decomposing, it has formed in some places an imperfect porcelain clay. Its composition is as follows:

	LABRADORITE.
Silica,	55.75
Alumina,	26.50
Lime,	11.00
Iron,	1.25
Soda,	4.00
	98.50 KLAPROTH.

This species is usually smoke-grey, though the exposed surface of the rock is grey or greyish white: it appears to be bleached.

Mica, another mineral found in granite, gneiss and mica slate, has a composition much like that of the felspars, or at least is analogous to them, as containing two alkalies, potash and magnesia; thus,

	POTASSIC MICA.	MAGNESIAN MICA.
Silica,	46.10	40.00
Alumina,	31.60	12.67
Protoxide of iron,	8.65	19.03
Potash,	8.39	.....
Magnesia,	....	15.70

Together with a variable proportion of oxide of manganese and fluoric acid.

Hornblende, which often replaces mica in the granites, is usually a dark green substance, and extremely tough in the mass. It is commonly crystaline, and more or less fibrous. It differs essentially from the micas and felspar, in containing larger proportions of lime. It consists of

	Hornblende.	
Silica,	42.24	
Alumina,	13.92	
Lime,	12.24	
Magnesia,	13.74	
Protoxide of iron,	14.59	
Oxide of manganese,	0.33	
Fluoric acid,	1.50	
		98.56

All these substances are termed *silicates*; the silica uniting with each of the principal elements as an acid, and forming thereby silicates of alumina, potash, magnesia, and iron. In the northern as well as the southern highlands, *pyroxene* or *augite* enters largely into the constitution of the primary rocks. Its composition does not differ materially, so far as its effects upon a soil is concerned, from that of hornblende; thus,

	Pyroxene.	
	Light colored.	Dark colored.
Silica,	55.32	54.08
Lime,	27.01	23.47
Magnesia,	16.99	11.49
Protoxide of iron,	2.16	10.02
Alumina,	0.28	0.14
Manganese,	1.59	0.61
	103.35	99.81 Rose.

To the same family belongs the *hypersthene*, which gives name to the rock forming the highest grounds of Essex, namely, *hypersthene rock.* This substance contains less lime than hornblende or augite, and hence is less favorable as an element of soil; in fact, it is remarked, that where it exists in sufficient abundance to influence the nature of the soil, it is quite barren. It is composed of

	Hypersthene.	
Silica,	51.35	
Lime,	1.84	
Magnesia,	11.09	
Protoxide of iron,	33.92	
Water,	0.50	
		98.70

At the north, however, this substance existing in but a small proportion in the hypersthene rock, has but little influence upon the quality of the soil ; besides, being mixed largely with labradorite, which contains both lime and alumina, the soil formed therefrom may be considered as good for grains and grass. Quartz or silex, too, is extremely scarce in this rock ; and hence there is no excess of sand in it, as there is usually in a pure granitic soil. Hypersthene, upon the whole, may be considered as rather a rare mineral in New-York. It is found in gneiss in Johnsburgh, but in such small quantities that it has no influence upon the soil.

Serpentine is another primary rock, disposed to crumble into soil. It is one in which magnesia is the characteristic element. It consists of

	SERPENTINE.	
Silica,	40.08	42.69
Magnesia,	41.40	40.00
Water,	15.67	16.45
Protoxide of iron,	2.70	1.00
	99.85 SHEPARD.	100.14 VANUXEM.

Serpentine may be known by its softness, and yellowish green color. It is easily cut by a knife, or easily impressed, and it is always found softer upon the outside than upon a fresh fracture ; the color, too, is much paler on the weathered surface.

In foreign treatises on agricultural geology, serpentine is set down with those rocks which make a poor soil. Thus, Johnson speaks of the soil at the Lizard in Cornwall, as being far from fertile, and so retentive of water as to form swamps and marshes ; and even when drained, it rarely produces good grass, or average crops of corn. It is the opinion of the same distinguished writer, that the barrenness is due to the small quantity of lime contained in the soil ; serpentine, as will be seen from the above analysis, being destitute of this element. In New-York, and part of New-England, it would appear that the serpentine exists under different conditions. Thus, in St. Lawrence, Jefferson, Essex and Warren counties, it is intermixed with lime, and the lime disintegrates more rapidly than the serpentine ; the soil, therefore, must contain a sufficient quantity of lime. However this may be, there is always a luxuriant growth of vegetables about these beds. The serpentine hills of New-England are not so productive as those of

New-York. I allude more particularly to the hills of Chester and Middlefield, along which the great Western Railway passes. Still, I have seen good crops of rye growing there, though the soil may have derived a beneficial influence from the decomposition of the neighboring rocks composed of hornblende and sienite. Here is also a peculiar vegetation: the *Ilex canadensis*, and some other herbaceous plants, are only found here, and this is the only place where any thing like a pine grove has been planted by nature. For localities where serpentine prevails, see the Report of the Second Geological District.

In this connection, it would be proper to state the composition of *basalt* and *greenstone*, although in New-York they do not form very extensive beds.

	BASALT.	GREENSTONE.
Silica,	46.50	57.25
Alumina,	16.75	25.50
Lime,	9.50	2.75
Magnesia,	2.25	.....
Soda,	2.60	8.10
Iron and manganese,	20.12	3.50
Water,	2.00	3.00
	99.72	100.10

The composition, however, of these varieties of rock is extremely variable, but all are known to contain the alkalies and alkaline earths; and it is owing to this fact that the greenstone soils are remarkably fertile, so much so that they may often be employed to increase the fertility of less favored ones.

§ 4. CHARACTER OF GRANITIC SOILS.

Returning once more to the consideration of granitic soils, I remark, that they are too siliceous and porous when derived purely from granite. Position, however, alters their character; for where they lie upon sloping surfaces, sand predominates; but in the valleys, the fine alumine or clay of the felspar accumulates and forms an admixture of clay and sand, which is more favorable to the support of grass and grain. On reviewing the composition of the minerals which enter as elements in rocks, we find that the most abundant of them contain the proper proportions for a good soil. Silex rarely forms less than one-half; the remainder is made up of alumina (which is essential to the consistency of the soil,) lime, potash, soda and iron, some containing more and some less of each respectively, the alkalies being the most essential, and rendering a soil rich, as it is termed, in proportion to their amount. In addition to the fact here stated, I may observe that the tendency to decompose is also increased in proportion to the percentage of the alkalies contained in the mineral: a rock of pure quartz is acted upon very slowly, while one in which felspar and mica exist crumbles rapidly.

In applying the preceding facts, it is easy to see how farms and estates should be selected in a primary district. The depth of soil is an important fact, as is well known, but its derivation is another equally important. For its determination, the outcrop of rocks upon hillsides may be examined, and their nature ascertained; whether their exposed or weathered surfaces are bleached, and softer than that of a recent fracture; or whether they are crumbly, and disposed to disintegrate. If the rocks are hornblende or pyroxenic greenstone, or a coarse granite with large masses of felspar, we shall expect the soil to contain the alkalies or alkaline earths; and if by cultivation they become exhausted, we may expect that by deep or subsoil ploughing a fresh quantity can be brought to the surface for the use of vegetables, and thus a constant reproduction of them obtained from the decomposition of the coarser particles now intermixed with the deeper soil. Greenstone and trap, from their more ready disposition to undergo change, may be ranked among the best materials for a foundation soil, and possess all the requisites desired for the cultivation of grains and fruits. They are not so porous as the granitic sands that are termed *leechy*; nor so compact as many of the argillaceous soils, many of which retain the water in pools upon the surface.

§ 5. DRIFTED SOIL.

A farther consideration of the causes which have distributed the soil and spread the debris of rocks at a distance, is of some importance while treating of the northern counties; as it may appear to those who are familiar with the drift or diluvial theories, that little reliance can be placed upon our instructions for determining the character of the soil by observing the rocks beneath. It is true that we find the debris of distant rocks in most of our soils; yet we find that their essential character is, with some exceptions, derived from the rock near by. On the northern and northwestern slope of the highlands in Franklin county, many boulders of Trenton limestone may be found, which, together with some of the finer matters, were brought from the Canada side, and probably this transported debris exerts some influence; still there is a predominance of soil from the Potsdam sandstone, the underlying rock of a great part of the county, particularly the northern part. In the neighborhood of Malone, immense drift beds have been accumulated, in which the boulders of this sandstone always predominate. They have also been transported south, and lap on to the primary masses, and modify the soil of the granite and gneiss; but when we penetrate deeply into this great primary region, its distinguishing characters are derived from the masses beneath. In some instances the drift current has left nothing but loose boulders, which, resisting decomposition, all the soil we now find is of modern or recent origin. Narrow formations, whose strike is east and west, will usually be covered with a more distant soil than those whose strike is north and south. Of this fact, we shall have occasion to speak hereafter.

Little need be said of the northern highlands in regard to structure. The country being either mountainous or hilly, almost the the whole surface is properly drained, or else is easily drained where, from local causes, water may be retained in the subsoil. The valleys are narrow, the hills abrupt, and there is no necessity of searching the peculiar structure of the rock to open a passage for stagnant water. The spontaneous growth of grass is the most interesting fact; the country being best adapted to pasturage, or the keeping of stock for wool, butter and cheese.

This district is, however, broken by the steepest and highest precipices in New-York, or indeed in all the Atlantic or Middle States. The Adirondack pass is a giant precipice. It is feebly represented facing this chapter, for it is only a feeble representation which the pencil can give. To be conceived, it must be seen. Many minor precipices break up the country at the sources of the Hudson, and thus diminish its value as an agricultural district.

RELATIONS OF VEGETABLES AND ANIMALS.

The world in which we live may be considered as naturally including two great classes of bodies, viz: Animate and Inanimate. The latter class consists of the atmosphere around us, the various bodies of water, and the earth with its mineral contents. To the former class belong all those various forms of living beings which swarm upon the earth and teem in the air and water, including the plants, which form, in one respect at least, the connecting link between the animate and inanimate—the living and the dead. Whatever *life* may be—whether an abstract and undiscoverable principle or essence of the metaphysicians—whether it be the product of a number of forces acting in conjunction—or merely and simply chemical action—whatever it may be—one thing is certain, we know it and recognize it only in its effects. No one can say of the egg or acorn that it is alive, except by presumption, for it gives no sensible evidence of life. But let either be subjected to the action of certain circumstances, and they grow warm and active with life. The chick in due time breaks forth from its prison a living and breathing animal, and the oak in due time spreads the shade of its broad "hundred arms" far over the land, and we say *they live*. This is all we know as yet of life.

But of living beings we know more. We can trace the power of the vital principle by its effects upon matter in giving to it forms and functions, which unaided mere matter could never assume. These changes we can follow in the acorn or the egg, from the first moment that life begins to mould them, till the perfect plant and animal are produced. We cannot see how they are produced—we can only see that they are.

We cannot imitate the products of life. Very many of the combinations and changes which take place in inanimate nature we can copy, or by resources in our power we can produce the same results. We can separate the elements of water and ascertain its composition—and we can take the same elements and reunite them, so as to produce water again. We can analyze the most intricate of the products of life, but we cannot reunite even the simplest, so as to form the same compound. Here the art of the chemist is baffled, and the wisdom of the wise is proved foolishness.

The chemical composition of plants and animals is precisely the same. This will be readily seen when we come to consider the fact that the animal is fed by the vegetable, not only by simply eating it, but because the particular and individual parts of the animal are first prepared by the plant before they can become available for the food of the former. While for a long time, oxygen, hydrogen, nitrogen and carbon were considered the sole necessary constituents of animal matter, the so called inorganic parts being regarded as only accidental, the same substances were viewed as the constituents of. vegetables, with the exception of nitrogen, which was supposed to be present in but very few plants. But the fact is well established now, that the component elements of both are the same, and that nitrogen is always present in the vegetable as well as in the animal.

It has been attempted to establish some sort of analogy between plants and animals, which does not exist. The only point in which they resemble each other, is in the possession of life, but this is employed in the production of very dissimilar results, and the vital action is developed in essentially different ways.

Animals require food of a highly organized character to support life. They are provided with a digestive apparatus of an intricate construction, by means of which the food when once received, is partially disorganized, and prepared for the building up of the body. They are incapable of appropriating or assimilating the elements which they require, in an unorganized form.

Plants, on the other hand, require food entirely disorganized. The construction of their organs of digestion, if they may be called so, and especially their mouths, is such that they can receive no nutriment till it is so much decomposed as to be reduced to a fluid form by solution. The spongioles of the roots are the proper mouths of plants. These are pierced by numberless small holes or pores, which are the extremities of their circulating vessels. Into these pores nothing solid, although never so finely divided, can enter. Fluids only are capable of entering, and in this form plants receive all their nourishment. Within these vessels, under the influence of light and heat, very powerful chemical affinities are continually at work, by means of which, changes of an intricate character are produced. The most wonderful of the powers of animal life are small, compared with these.

Animal bodies are constantly undergoing change. From birth to death, the animal is subject to a continual waste. Every motion, the most trifling as well as the most powerful, is accompanied by a loss of matter. Every breath we exhale carries away its share of our bodies. The lungs—the skin—the intestines—are all avenues by which the particles which compose the animal structure are thrown off and separated. So that it is true that in the ordinary length of human life, the entire body is several times entirely changed. This will be easily understood, when we reflect, that by means of the lungs alone, during the process of respiration, a full grown man will daily discharge several ounces of carbon.

We have no evidence of any such waste in vegetables. From the moment of germination through the whole life of the plant, there is a constant accumulation of matter. There is no time when it ceases to grow, till it ceases to live. As a general rule, there is a limit to the growth of the animal, when it has reached which, all the vital force is expended in maintaining the bulk it has attained. After a time, it is insufficient to support this, and the disposition to waste predominates, and for the remainder of life the body progressively diminishes, till death supervenes upon the worn-out forces. But there is no fixed limit to the growth of vegetables. Supply them with the requisite food and they continue to grow and add yearly to their bulk. The natural period of life for some is but one or two years, and they have attained their full size, and die. But as far as is known, perennial plants are without limit to their life, and do not die of old age. * Trees are at this day growing upon this earth which are many hundred years old, and yet seem to flourish with perpetual youth. However this may be, as long as plants live, they constantly are adding to their size.

But different as animals and vegetables are in these and other respects, they are, to a great degree, mutually dependent upon each other for life. If the animal kingdom is supplied with food by the other, by the constant waste which is going on in its organiza-

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* The reader is referred in connection with this subject, to an extract on another page of this No., on the "Duration of Varieties of Fruit Trees."—Eds.

tion, it restores this same food to the atmosphere or the earth, to be again absorbed by the plant and reconverted into food, thus going an eternal round. But we will examine this subject more at large, and shall thus be enabled to perceive more distinctly the intimate and mutual relation those two great kingdoms of nature sustain to each other.

A large part of the food of plants consists of carbonic acid, which they absorb largely by their leaves. Though they are not utterly dependent upon animals for this, yet from them they are always receiving a large supply. It has been stated already that a full grown man discharges from his lungs, daily, several ounces of carbon; the larger animals, of course, a greater quantity. But this is not in the form of pure carbon. The process of respiration consists in inhaling oxygen of the atmosphere into the lungs, when it unites with the waste carbon of the body, and is exhaled as carbonic acid. Should this process be continued for a long period—a very long one it is true would be required—and were there no provision for the removal of this acid from the atmosphere, it would ultimately become so abundant as to poison the whole race of animals. But it is absorbed by the leaves and roots of growing plants, to sustain their life, and thus the atmosphere is purified.

By the continual consumption of oxygen by the respiration of animals, the apprehension would be perfectly reasonable that in process of time this gas, so essential to their existence, would become so much diminished, as to be inadequate to their wants. This would in fact be true, were it not for the compensating power of plants. The carbonic acid which they have absorbed, whilst passing through their circulation is decomposed, the carbon fixed in the vegetable system, and the oxygen, again liberated by the leaves, is restored to the atmosphere. Thus is completed one link in the unending chain of organic life.

It is not the carbon exhaled alone which becomes the food of the vegetable. All the solid and liquid excrements of animals are applied to the same use. The body itself dies, and passes to decay. It mingles with the atmosphere and the earth, and becomes the food of plants, to be by them converted into food for the animal. And here the remarkable difference, hinted at above, between the two kingdoms, becomes evident. The changes in the animal are in a descending scale. The food eaten is in a highly organized form. It enters into the structure, only to pass soon through a change which entirely disorganizes it. In this state, it is fit to become the food of plants, when in them the ascending scale commences. The unorganized materials are, by the plant, produced in an organized form. That the living vegetable has the power of decomposing certain compounds cannot be doubted. The carbonic acid, ammonia, and water are separated, each into their individual elements, before they are incorporated in the structure. The metallic and earthy salts are readily decomposed by the vital force, and again recombined in new forms. The vegetable and animal substances applied to the soil as manures, are not reduced to their simplest forms before they are taken up by the plant. All that is necessary is that they should be soluble. Thus they are capable of supplying carbon in other forms than that of carbonic acid. The fluid extracts of vegetable substances are capable of being absorbed, and we know nothing which would contradict the fact of their being decomposed in the system, and placed in the tissues.

The food of animals is in all cases highly organized. The animal has not the power, like the vegetable, to assimilate unorganized matter. And upon this point modern science has thrown great light. The plant is the laboratory in which all the food of animals is first prepared. The fat—the material for the formation of the muscles—the salts for the bones, &c., are formed in the plant, either in the same state as they exist in the animal or in such a form as to require but a slight change to bring them to such a state, so that the process of digestion would seem to be little more than reducing the materials consumed by an animal to a solution, in order that they may be taken up by the vessels and carried to be deposited in their proper places, to build up the body or compensate its waste.*

Thus again the two are dependent upon each other, the animal disorganizing the food it eats, for the nourishment of plants, which in their turn again organize it for the use of the animal. The plant is in reality the producer, and the animal the consumer.

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* A gentleman extensively engaged in the investigation of the medicinal properties of plants, has lately informed me that in the cold infusion of vegetables he has discovered globules corresponding in all but color to the molecules of the blood.

Were this the proper place, it would be interesting to carry out these views farther. But for a more extended view we must refer the reader to the late works on organic chemistry and physiology, where they may be examined at large.

From these facts, some practical hints may be derived, of great importance to the cultivator of the soil, and to the improving and growing of stock.

1. The amount of crops upon a given extent of soil must depend upon the amount of food they receive. The quality of the crop may, and probably does, depend upon the quality of the food. The excrements of animals being composed of those substances which once formed the vegetable, and the bodies of animals being the same, are of course capable of affording to plants the very food they need to bring them to the greatest perfection. And this has ever corresponded with practice, the greatest effects being shown when the purest animal manures are used. Let it then be remembered, that every particle of animal matter that is wasted and not applied to the soil, is so much robbed from the productiveness of the earth. If all that is taken from the soil and used for animal food were restored to it, the land would never become impoverished, and in proportion as more or less is restored, in such proportion will the land retain its vigor and capacity to produce more.

2. All plants do not furnish the same animal food, nor in the same quantity. It is desirable then to adapt the kind of food to the effect intended to be produced. If fat is required, those kinds of food which yield the most oil, and starch, &c.; and so in reference to other parts. Enough is not at present known to establish any rules, and it is desirable that in this the practical farmer would unite with the chemist in investigating the matter.

We have but just stepped upon the threshold of science. We believe the same of practice, especially in agriculture. Whilst the whole range of arts beside has owed the proud stand they at present occupy to the aid of their handmaid, science, farming has presumed to go alone, and if we may believe the evidence of history and of our own senses, has rather degenerated than improved. At any rate it has advanced none. Improvements which were suggested half a century ago, are neglected, and are now just beginning to be employed. Till within a few years nothing was known of the relations of animals to plants, or of plants to the soil they grow upon. And at the present day, how few compared with the great mass of practical farmers, know any thing of the principles of this noblest of human arts. Much remains to be known, but enough is already understood, if properly applied, to add immensely to the productiveness of the soil and the happiness of our race.

ODD SPELLS.

BY GILES B. KELLOGG.

I. The Farmer.

"The best part of the population of a country are the cultivators of the soil. Independent farmers are every where the basis of society, and the true friends of liberty."—*Andrew Jackson.*

I love to contemplate the quiet life and the honorable occupation of the farmer. What pursuit is more useful than his? Diligence in his business reaps the promised rewards of charity—a double blessing. He cannot be useful to himself in his calling without being useful to others. The faithful discharge of his duties has a reflex and self-improving action. The influence of his example is contagious and beneficial on others. On the products of his industry depend for subsistence the larger portion of the human family. With his prosperity is identified the prosperity of every other branch of labor; and the well being, the advancement, the power of the country, may be measured and pretty accurately determined by the position and the influence which he occupies and exerts. As a general fact, no nation ever became wealthy, powerful and great, whose cultivators of the soil, the men who owned and held the plough, were ignorant, degraded and servile; and an enlightened, industrious and prosperous farming community never conferred other than a high character on its nation.

And then again his occupation is one of moral dignity. His employments are among the creations of the great Architect of the frame-work of nature, and intimately associated with His wisdom, goodness, power and constantly superintending care. In the pursuit of his labors he becomes a co-worker with that great and good Being, of his dependence on whom he is constantly reminded, in the promotion of the happiness of his fellow men. In the vegetation of the seed he has committed, in confidence of a harvest, to the ground—in the blade of grass that springs up at his feet—in the flower that smilingly meets his eye along his pathway—in the birds of the field and forest that welcome him to his daily toil—in the cattle grazing upon his hills, he recognizes a wisdom and a care for which nothing is too high or too minute. "No occupation is nearer heaven. The social angel, when he descended to converse with men, broke bread with the husbandman beneath the tree."

And on the farmer the country relies for assistance and safety in times of public danger and calamity. He it is who furnishes the means of defence—who supplies the sinews of war—whose strong right arm guards the hearths and homes of the country, and whose reliable patriotism shines brightest when patriotism is put to the severest test. The farmers of our Revolution were men of no common honesty, of great intelligence, and of more than Roman virtue; and in no small degree to them it is that we owe the achievement of our liberties. "Not a blade of grass springs at Saratoga, but takes to itself a tongue to proclaim the successful valor of patriot husbandmen." And in every crisis of our nation's existence it has been the farmers who have stood by the ark of our safety and carried it triumphantly through the storm.

Jefferson was a close observer and discreet judge of men, and his opinion of this important and honorable class of our community is entitled to great weight. "Those who labor in the earth," he early declared, "are the chosen people of God, if ever he had a chosen people, whose breasts he has made his peculiar depository for substantial and genuine virtue. It is the focus in which he keeps alive that sacred fire, which otherwise might escape from the surface of the earth. Corruption of morals in the mass of cultivators, is a phenomenon in which no age nor nation has found an example. It is the mark set on these, who not looking up to heaven, but to their own soil and industry, as does the husbandman, for their substance, depend on the casualties and caprice of customers. Dependence begets subservience and venality, suffocates the germ of virtue, and prepares fit tools for the designs of ambition. Thus the natural progress and consequence of the arts, has sometimes, perhaps, been retarded by accidental circumstances;

but generally speaking, the proportion which the aggregate of the other citizens bear in any state to that of its husbandmen, is the proportion of its unsound to its healthy parts, and is a good enough barometer whereby to measure its degree of corruption."

II. The Temperance Reformation among Farmers.

"So, when our children turn the page,
To ask what triumphs marked our age,
What we achieved to challenge praise,
Through the long line of future days,
This let them read, and hence instruction draw—
Here were the many blessed,
Here found the virtues rest,
Faith linked with love, and liberty with law;
Here industry to comfort led,
Her book of light her learning spread;
Here the warm heart of youth
Was wooed to temperance and to truth;
Here hoary age was found,
By wisdom and by reverence crowned."

Charles Sprague.

No reform of our day has been more marked and beneficial than the effect of the temperance movement among farmers. From the point in the progress of this cause which we now occupy, we look back with a shudder at the effects produced by intemperance—effects bounded by no particular territory and confined to no particular class, but spread every where and affecting alike the high and the low, the rich and the poor, all ages and both sexes, every rank, station and condition of life. We saw this monster of evil invade the splendid abodes of the wealthy and overcome its inmates by his fascinations. We saw him creep into the hovels of the poor and make desolation still more desolate. We saw him weaken and paralyze the arm of labor—put out the light of learning—strike down the loftiest genius—change the immortal destiny of man, and degrade woman from her pure and exalted station. We saw him mar the face of youth and beauty—waylay the path of usefulness—nip in the bud the unfolding promise of manhood, and drag down to the tomb in disgrace the white locks of matured old age. We saw him the worshipped divinity of every nation, and every community, the household god of every abode from the palace to the poor-house, at whose shrine were offered up the morning, mid-day, evening, and midnight sacrifice. We saw him robbing the generous sailor of his last farthing

—pilfering the hard earnings of the industrious mechanic—plundering the adventurous merchant by wholesale—stealing away the products of the labor of the husbandman, and bringing under the terrible power of his fascination the high in station, the learned, the accomplished and the venerable. In short, we saw the evils he entailed upon his immediate victims—to quote another—to be, "self-reproach, mental anguish, enfeebled intellect, brutalized passions, poverty, crime, infamy, disease, despair, madness and death; to their dependent families, shame and mortification, withered affections, blasted hopes, misery and want, reproaches and violence; in fine, disgust, loathing, and unspeakable wretchedness; to the public bad example, neglected duties, violated laws, the streets filled with beggary, and the courts with offenders, crowded alms-houses and prisons, the industry of the country burthened and oppressed, the general morals vitiated, public virtue degraded, and the very foundations of government weakened and endangered."

And who can wonder at this awful extent of vice and misery, when he remembers how all-pervading and firmly established was the use of intoxicating drink? This offspring and agent of perdition was the inmate of the drawing-room and the kitchen; he was domesticated into a nurse of children; he worked in the fields with the farmer—helped him harvest his crops, and always went with him to market, or met him there; he was the principal personage at births, marriages and funerals; he was the getter-up of most quarrels, and no quarrel could be settled without his friendly interference. At anniversaries, at civic celebrations, at military displays, at social entertainments, at religious observances, at the farmers' bee, and the ladies' tea-party, he was always first and foremost—the most busy and the most noisy. Freemen could not properly remember the day of their country's birth, without getting independently drunk, and acknowledging allegiance to a power far more despotic, more heartless, more cruel and exacting, than any of the race of Tudor, or Stuart, or Brunswick. He helped to elect the candidate to office, and then while he rejoiced with his friends over his success, with an equal largeness of heart, sympathized with his opponent at his defeat. He was present on all occasions, whether of joy or grief, sacred or secular, ready to furnish the inspiration suited to the occasion, and in the requisite quantity. He welcomed friends on their arrival, and dismissed them on their departure. Hospitality, without an introduction to him, was considered boorish, and he who declined an acquaintance with the master-spirit of the house, was sure to insult the host. He was the patent quack of the world—his nostrums a sovereign balm for all "the ills that flesh is heir to"—would restore to health when sick, and ward off disease—would keep in the heat in winter and keep it out in summer—would induce to sleep when necessary, and when necessary drive it away. He was the rewarder of every trifling service which had no pecuniary value—the solace of the idle and the companion of the laborious—helped prepare the discourses for the pulpit and then inspired a mighty eloquence in their delivery. While robbing the poor of their last cent and binding them out in eternal servitude, he made them believe they were richer than Crœsus. Soldiers, under his command, were "intoxicated into valor,"

> "And their hearts, though stout and brave,
> Still, like muffled drums, were beating
> Funeral marches to the grave."

"Age, with his white locks and tottering frame—manhood, in his fullest strength—youth, in his freshest bloom, and beauty in her sweetest charms," were all stricken down together, by this inhuman spoiler of the race and great ally of death.

But, thanks to an enlightened humanity, to labors of the benefactors of their race, to sterling common-sense, and, above all, to the blessings of an over-ruling Providence, the progress of this mighty evil has been stayed, and the farmers of our country deserve no little credit for their agency in the good work. The improvement among them is manifest. It has been found that the fruits of the earth can be better cultivated, turn out more abundantly, and, when ready for the garner, can be more securely gathered in, without the aid of this unnatural and noisy co-laborer—this exacting god, the sacrifices at whose shrine are, loss of sense, and damage to the farmer's estate. It is not, as it used to be, so much the custom to pour out libations of manufactured poisons at his shrine. And the result has been, increased prosperity, better health, clear heads, stronger and steadier arms, constitutions better fitted to encounter toil and endure fatigue, and hearts more susceptible of being inspired with gratitude to "that universal Providence which watches over the seed time and matures the harvest."

ON DRIFT AND THE CHANGES WHICH HAVE BEEN EFFECTED IN THE POSITION OF SOILS; ETC.

[Communicated to the American Association of Geologists and Naturalists, May, 1844, by one of the Editors.]

SCARCELY a more interesting or important fact has been brought to light by geological research than this, that in the northern regions at least, there has been a general movement of all the loose materials covering the surface of the earth. This movement is highly interesting from the consideration of the nature of that force by which it was effected, as it is by no means one of those ordinary occurrences in the history of the earth, the precise and exact nature of which geologists have not as yet been able to determine; besides, so wide and general was the movement that it involves in its consideration a force whose operation extended in this country from the base of the Rocky Mountains to the shores of the Atlantic.

It is highly important, then, from the above considerations, that this movement which has influenced so widely the nature and fertility of the soils, has mixed and mingled them in proportions very different from what could have been effected by the slow and ordinary operations of nature, should be fully understood. In some instances those soils which were naturally barren have been carried and spread over those of a more fertile character; in other instances the latter have been spread over or mingled with the barren, so that probably upon the whole the general effects have been favorable to husbandry, and that upon a great scale, there has been an equalization of benefits, or like all the great operations of nature, the universal good has been effected by the instrumentality of general operation. Having alluded to the fact of movements as indicated and proved by observations on every side, we may now state definitely one or two established points which greatly increase the importance and interest of the phenomenon here alluded to. The first and most important fact is, that soils have been carried from north to south, and that in no well authenticated instance in this country has this movement been from south to north. From this fact, then, follows an easy, though practical application of the fact, viz: that in searching for certain peculiarities of a given soil, we must go north; for the rock itself which has furnished originally the material composing the soil will probably be found only in this direction. Take, for example, the distribution of the Onondaga limestone, which forms the surface rock from the Hudson to Lake Erie, and where do we find its fragments? We certainly never find them a mile north of the outcropping edge of the rock; but they are every where found south within a limited range, and wherever they are found in numbers they do modify the soil;—and wherever we travel, if we find the boulders or the gravel of a certain character, we may, without experiment or even farther observation, form some exact and definite conclusions in regard to the nature and properties of the soil. These considerations, then, show us one very important practical geological fact—one which every agriculturist ought to know, and which we are assured may be often applied in investigations upon the nature and composition of soils in this country, and which will explain some facts in husbandry which otherwise would remain inexplicable.

Again, the course or direction in which the drift or soil has been transported is determined by furrows upon the rock beneath. These furrows correspond in direction with the course of the drift. That they are made by gravel and sandstones passing along over the rocks, is proved by actual observation; for example, a boulder is often found at the extremity of the furrow which it has been instrumental in forming; it is precisely in the position in which the farmer leaves his plough in its furrow when he unyokes his team at the sound of the dinner horn, and its course for a limited distance may be traced with equal certainty. On this fact rests the statement which we have just made in regard to the agents which have scored the strata.

We now proceed to give the language of the paper which we prepared on the subject of drift for the Association of Geologists and Naturalists. The remarks we have already made do not form a part of this communication, but were deemed necessary in this place in order to show the practical bearing of the subject; and inasmuch as those who till the soil are constantly meeting with phenomena illustrating this interesting and important subject, they ought especially to be well versed in all. the facts which bear directly or indirectly upon the subject.

During the past year, (1843,) the field of my observations on drift, have been confined to the western part of Massachusetts, the eastern counties of New-York, and a belt of country extending from the Hudson to Buffalo, on the line of the Erie canal. Of my observations as a whole, I will in the first place remark, that they go to establish most of the great principles in relation to drift and diluvial action, which have been heretofore presented to the Association—those for instance which relate to the scoring of rocks, the course in which drift was transported, the materials of which it is composed, the period of its transport, the great power and force expended in its transportation, and partly in regard to its organic remains.

As it regards the direction of grooves upon rocks, and the kind of materials of which any drift bed may be composed, the general law is, that the first have a direction varying but little from north and south, and the latter show that the materials also were derived from the same direction. But occasionally an important exception to this law is found; for, where a powerful barrier lies in the direction in which drift was transported, it is always deflected from its course; thus, both the grooves upon the rocks and the drift itself, near the base of the Catskill mountains, show a deflection of the current of drift to the east, or, through the present valley of Catskill creek which flows in an easterly direction, and the boulders derived from the northern outcrop of the Helderbergh rocks, are transported across the Hudson at Catskill and lodged upon the eastern bank of the river, in Columbia county. These facts go to show that the Catskill mountains, of sufficient height to form a barrier, existed at the period of the drift, and operated as a barrier to those drift currents: and another fact, having the same bearing, is, that no foreign boulders are lodged far up the sides or upon the summits of the Catskill.

My observations, however, on this last point are limited. But the general law that drift had a northern origin, is finely illustrated in all the drift beds which lie in a belt of country from the Connecticut river at Springfield, Massachusetts, to Buffalo, on the line of the western railroad and Erie canal. Thus, on this belt I find five distinct kinds of drift, differing according to the kind of rocks which exist in places to the northward of the points of observation.

First. Towards Springfield on the east, the boulders and gravel beds are composed of gneiss and mica slate.

Second. In Berkshire, and eastern part of New-York, of the rocks of the taconic system ; and so well defined is the latter belt, that there is no intermingling of the rocks of the two adjacent systems, except upon their very borders.

Third. In the valley of the Hudson river, the drift beds are composed of rocks of the Champlain group.

Fourth. In the valley of the Mohawk, thirty miles west of Albany, at Amsterdam, I find a great abundance of the northern primary rocks, and particularly the *hypersthene rock*—which is confined to a small space of country directly north ; and finally, another belt towards Rochester and Buffalo, in which the harder layers of the Medina sandstone, the harder parts of the Niagara limestone, together with primary boulders—among which I think I can discern the hypersthene rocks of Labrador—together with some foreign boulders whose origin I have been unable to determine.

Again, of the direction of the grooves, and of drift, when compared with the direction of *valleys*, I would remark, that although I find frequently a *parallelism*, still there are some notable exceptions, even when no apparent barrier existed to the course of the drift currents. Thus, the western face of Petersburg mountain is scored upon a slope of 30° or 35° upwards ; and again, in many localities I have found scorings upon the perpendicular faces of rocks parallel with the valleys in which they lie.

As it regards the organic remains of drift, I am forced to differ in part, from the views of Mr. Lyell, as given in a late No. of the Journal of Science. Mr. L. maintains that the tertiary of Champlain, which I have described in my New-York Report, is drift. From this view I beg leave to dissent, for if any formation furnishes stronger evidence of having been deposited in quiet waters, I know not where it is to be found ; but towards the close of the period in which this formation was deposited, we have strong and undoubted evidence of disturbance and of transport of the materials of which it is composed. And it is in the transported beds of sand and coarse gravel, that we sometimes find the broken shells of the mya and saxacava. The boulders which are found at Beauport, in Canada East, in the midst of shells, were unquestionably dropped from icebergs, for it would be contrary to reason and fact, to suppose for a moment, that the delicate terebratula psittacea could have been moved with the drift or disturbed by currents, and maintain their perfect integrity.

I will state farther, in this connexion, that I am forced to differ from Mr. Lyell and some other geologists, as it regards an essential change of temperature at the period of the tertiary or drift. But I do not propose to state my objections, in this place. I have but one subject more which I wish to bring before this Association, viz: the immediate agent which was instrumental in the transportation of drift. On this subject, I would speak with due deference to the opinions of others. But I will observe, generally, that I believe no *one agent*—no *one cause*—no *one theory*, will be found adequate to the explanation of all the phenomena of the drift of this country and of Europe—applying the word drift to all accumulations of sand, gravel and boulders, except those which are now forming by rivers.

The observations of Agassiz and Prof. Forbes, go to show that the *movements of glaciers* are, and have been, causes. Observations of most navigators show, that for transportation, *icebergs* are causes—and all may see, that waves in shallows do wash up ridges of sand and gravel parallel to coasts. But what agent transported the great mass of the drift of New-England and New-York. On this point, I maintain that moving water in a given direction, is the *essential element of our reasoning*. This moving water may, or may not, transport ice—ice, if moved, must be moved by water. Starting with this element, and taking into view all the phenomena of drift and of scorings of rocks, I find no agent or power adequate to the solution of these phenomena, *but the rush of a northern sea, or waters over a part of this Continent, produced by a subsidence of land*, and aided, perhaps, by the rise of the bottom of the sea to the north. By this power, all the loose materials were pushed forward, en masse, and transported south, both scoring and breaking up those surfaces of the solid strata, over which it passed.

Proof that this theory has a foundation, is found in the fact that analogous changes in the relative position of sea and land has taken place; and also that immediately subsequent to the period when the rocks were scored in the manner now well known to all geologists, those northern waters did stand upon, and cover large areas of New-England and New-York. I refer to that period when the tertiary of Champlain, of Lubec, Portland, Me., and other places, were deposited; a period of quiet which immediately followed that of drift, oceanic action and transportation.

Immediately succeeding the period of quiet, another one of elevation must be recognized, during which some disturbance of the loose materials occurred; but in consequence of the wide area over which this elevatory action operated, the shape and contour of the surface has been preserved.

I am aware that high authority is adverse to the admission of a vertical movement; yet, adverse as it is, I know not how to reconcile facts and phenomena on this ground.

Such, then, are briefly the facts and conclusions which I have arrived at, in my investigations during the last year. That there are many points which are not cleared up, and that much more might be said, I readily admit. But what I have thrown out is sufficient to answer the object of this report.

Note.—Since the above was communicated, observations in the same field have been continued, and so far from abandoning the theoretical view which is here advanced, we see every day facts which sustain it. The important fact, which we have frequently stated on other occasions as well as in this report, that New England and New-York, as well as the wide extent of territory west and north, has been submerged, and was evidently submerged just posterior to the great drift period, never ought to be lost sight of. This fact is substantiated by the marine deposit of Lake Champlain, a deposit filled in many places with marine shells; and what is to the point, this marine deposit rests immediately upon the grooved and scored rocks. We are to put these two facts together, and when put together what do they teach us? first, that at a certain period some general agent was in force producing this very scoring, and which may be seen from the Atlantic to the Rocky Mountains. Then immediately follows this marine deposit upon the grooved surfaces of these rocks. Now, then, this whole country is beneath an ocean. Submergence has taken place, and this portion of the earth is quiet beneath the waters, and deposits are going on; shell fish of the same species as those now living upon our coasts occupy the bays and estuaries of this great sea. Then as it regards a vertical movement, nothing need be said. The sea in which this marine deposit was formed has retired, the plough furrows those reclaimed fields, and maize grows where the Mya saxicava, scalaria and other shell fish lived and multiplied. Such are some of the facts which, to say the least, bear favorably upon this hypothesis. And then again, by the admission of a vertical movement since the drift period, we certainly remove those obstructions which oppose the passage of an ocean over the tops of our highest mountains in New-York and New-Hampshire, the scoring of whose rocks prove the passage in question.

Note 2. In connection with the above, we take this opportunity to state that we have observed very interesting phenomena of the kind which forms the subject of the above remarks, at Plattsburgh and Cumberland Head, on Lake Champlain. On searching for fossils at Plattsburgh, in August, 1844, in company with our friend, Ransom Cook, Esq., we had occasion to split off a thick layer of the Trenton limestone. On examining the lower surface of the removed portion, we found it covered with relief lines, which led us to examine the surface from which it was taken, when we found it scored with lines which corresponded with those of the pieces which we had taken up. The scorings run east and west, or at right angles to those which we find on almost every rock in this state. So interesting did we deem these ancient marks that we determined to search for them at other localities; and we are pleased in being able to state that we were successful in finding the same stratum at Cumberland Head, four miles east. At both of these localities the rock is not only scored, but polished and worn down, showing conclusively the consolidation of the rock at the time when it was thus scored, Notwithstanding this fact seems so well determined, and moreover that a suspension for a time of a deposition of the peculiar materials of this rock, still, the layers which succeed the worn and polished surface are those of the Trenton limestone. In Plattsburgh we find surfaces with the ancient and modern scorings within ten feet of each other, and by comparison on the spot no one can observe any difference in the character of the markings themselves; though the former, as has been stated, run east and west, while the latter run north and south. I had observed similar phenomena at Essex, several years before this observation at Plattsburgh, and so stated the fact in one of our annual geological reports; but subsequently, fearing I had committed an error in my statement, made what I intended a correction in a subsequent report. This, however, seems to have been unnecessary. But as the facts seemed to me so extraordinary, and had not at the time been noticed by any geological writer, I deemed that course right when there appeared some doubt as to the correctness of the observation. Mr. James Hall has published in the reports, and elsewhere, an essay on mud furrows. These present phenomena *in part* similar to the scorings of rocks by diluvial action; still, in no instance which he has given, nor in any which we have observed, is the rock beneath polished. In this case there is a hard, sandy rock, the inferior surface of which is marked in relief by parallel ridges; the surface upon which this reposes is a fine and soft argillaceous mass, and was probably in the state of mud when the marked stratum was deposited; but it is not polished, nor does it appear that the phenomena in the two cases are produced by causes of the same nature. All these facts are so many incidents in the history of the earth. We may truly say that wherever we go, or on whatsoever side we turn our eyes, there we find interesting changes; these changes reveal many of the former conditions of the earth. The collection and recital of all these phenomena will be hereafter formed into a complete and perfect history; and the rapid accumulation of facts within the last quarter century, indicates that the time is not far distant when this history will be written.

Albany, June 1, 1845.

MANURES—THEIR ACTION.

We know of no subject in the whole field of agriculture where judicious and well conducted experiments are more needed, than in reference to this. The absolute use of manure is denied by no intelligent farmer at the present day, but nothing definite or fixed in relation to their mode of action—the manner and the proper time for applying them so as to produce the greatest effect—the kind proper to be used upon different crops—in fine, we may say, nothing at all is known in regard to their specific use. Leading agriculturists have been greatly at fault here. Agricultural societies have not directed that attention to the subject which they ought. Every man who tills an acre of land owes it to himself and to his own interest, setting aside his duty to the general interest, to investigate the matter in the most thorough way he can. Experiments only can determine the question, and they have not been made. In the absence of facts then, we shall indulge a little in theorizing upon a few points in connection with this subject, hoping that something may be suggested which will lead to practical results.

1. *Do manures owe their efficacy to their organic or inorganic portions?* * This may seem to many a small matter, or one deserving no notice. It seems so to us, we are free to acknowledge, in a practical point of view. But since many men of no small eminence have decided, some in favor of one portion and some of another, we may be pardoned for noticing it. Ever since the theory has been upheld by the professed followers of Liebig, that

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* We use these terms in their ordinary acceptation. But we must confess that we have never been able to understand why lime or potash should be called *inorganic* any more than oxygen, &c. Their relations to the organs and in the organs of plants are all similar. The one class are as necessary component parts of the plant as the other. We presume the names have arisen from the old idea, that the so called *organic* substances were all that actually constituted the plant, the *inorganic* being only accidentally present. We would therefore suggest the adoption of something like the following alteration:

a. *Inorganic matter*—all simple substances found in the composition of living bodies—potassium—sodium—oxygen—carbon, &c. &c.

b. *Organized matter*—the parts of living bodies composed of these simple substances—woody fibre—bark—muscle—nerves, &c.

c. *Organic matter*—the products of organized matter—sugar—gum—oil—starch—&c. &c.

This appears to be a much more consistent nomenclature.

plants derive all their carbon from the atmosphere, the tendency has been with them to attribute the sole power to the inorganic matter. Indeed, Liebig himself gives credit to the organic portions only for helping the plant to dispose of the inorganic portions of its food, which he seems to consider the most essential part of its structure. That it is possible for the atmosphere to supply the carbon and oxygen and nitrogen to plants in sufficient quantities, there may be no question; but *does it?* is one which it is not so easy to answer.

When one hundred pounds of wheat are burned, a quantity of ashes amounting only to a little more than one pound remains. All the combustible part, or that which was consumed by the fire, consisted of organic matter, or oxygen, hydrogen, nitrogen and carbon. The remaining ash is the earthy and saline portion of the wheat. The very smallness of the quantity contradicts the notion of the superior use of these materials in the food which has furnished them, and the large proportion of the other ingredients might seem to warrant the belief that they were the efficacious agents. Such reasoning might be carried still farther, and the least quantity of any one ingredient present in the necessary food of plants be considered the controlling power in relation to the whole.

But such reasoning is false in its whole extent. We know no reason why we should attribute peculiar virtues to one more than another. A plant is a compound body, and all plants of the same kind consist invariably of the same constituents, in the same or nearly the same proportions. Each one must be regarded as equally necessary in the vegetable economy, and the food must contain all, or the plant will not thrive. The different quantities requisite during the progress of the plant will be noticed hereafter. But what has been stated is the true philosophy of farming. It is to supply to the growing plant the whole food it requires to perfect its whole structure. If the soil already contains sufficient, no more need be given—if not, it must be furnished by manures. If any one ingredient is wanting, that one must be applied, and so with the whole list. The soil may be rich in vegetable matter and yet not produce good crops, because it is destitute of salts. Supply these and its vigor is restored. And on the other hand it is well known that to be fertile a soil must contain a certain proportion of vegetable matter.

That soils become exhausted of the saline portions more rapidly than of the other, cannot be wondered at, when it is remembered that these substances are restored in much the least proportions, in ordinary cases. The solid excrements of animals which constitute the mass of manure commonly applied, contain but little of them, whilst the liquid excrements which abound in them are suffered to run to waste. The thorough, rational farmer will always restore what is taken away.

We might carry this idea out to a greater extent, by turning to the animal and reasoning from analogy, which will hold good, we think, in this point. The same materials are necessary in the animal economy as in the vegetable. Yet no one will pretend to say that one class of substances is more useful to the general life and growth of the animal than another. All must be supplied in their due proportion.

We conclude, then, that neither the inorganic nor the organic portions of manures determine their value—that ammonia, supposed to owe its efficacy to its nitrogen, an almost undiscoverable quantity in most plants, and by many called "the life and soul of manure," is not the controlling force—but that each substance necessary to the plant has an equal effect in perfecting its structure and promoting its growth.

The simple experiment that would set this matter at rest, will suggest itself to any reflecting mind, and it is to be hoped that some one will make it.

2. *At what period should manures be applied?* The question which we have just briefly examined, we have attempted to answer upon the general principle. But in replying to this we might very naturally be led into the consideration of special manures, because from the facts in the case it is unquestionable that at different periods of growth, and also according to the kind of product to be obtained, plants must be supplied with different food. By referring to the first volume of this Journal, page fifty-three, tables will be found giving the different quantities of ash left by burning different parts of the same plants. It will then be seen that wheat straw leaves 3.51 lbs. in 100, whilst the grain leaves but 1.18 lbs. Now these unequal quantities in the different parts show beyond a

doubt that at one period of growth, a greater proportion of inorganic matter is necessary than at another—that the straw and the seed, although requiring the same materials, at the same time require the different elements in different quantities. The well known fact that the soil is more exhausted during the formation of the seed than at any other period of the growth of the plant, is explained upon this principle.

From the analysis of Sprengel it appears that the ash from 1000 lbs. of wheat contains more than 2 lbs. of potash, and 4 lbs. of silica, whilst the straw contains but one-fifth pound of potash and nearly twenty-nine pounds of silica. The great quantity of the latter substance in the straw is necessary to give strength to support its burden of grain. The variation is similar in other grains, and a like variation is seen in all the elements, in comparing the constitution of the straw and the seed.

The practical inference from all this would seem to be, that by accommodating the manures to the demands of the plant at different periods of growth, the straw or the grain might be improved at pleasure, or that we might at least expect a great control over the development of one or the other. How far this may be true it is impossible to decide, without more full and true experiment. This would consist in its simplest form in applying the same manure to two portions of the field at different times, to one portion when planted and to the other just before the crop goes to seed.

The experiments of Mr. Campbell, of soaking seeds in saline solutions, are very interesting in this connection. His object is to saturate the seed with the solutions, and, if we understand him, to thus supply them with all of those substances that they need for life, for he tried the experiment without the use of other manures, and in another instance in pure sand. It is to be presumed, however, that his expectation of reaping a tenfold crop by this means, in conjunction with other manures, has not been fulfilled, as we have never seen any statement of such a result. It has been stated before, that the probable good effects arise in this case from the vigorous start given to vegetation in the outset, by which the plant is early placed in a condition to appropriate large quantities of food, and also to obtain it under unfavorable circumstances.

If such is the case, great practical use may be made of the principle, and especially when in other respects, such as preparation of soil and manuring, the future wants of the crop are abundantly cared for. And if the principle is true, it will go far against the use of unfermented manures, particularly when the seed has not been previously prepared.

It is highly important that experiments should be tried on the effects produced by manuring at different periods of the growth of plants. Very little is in reality yet known of the principles which determine the action and force of manures, and consequently a great want of economy in the use of them, may be the result. By adapting the manure both in kind and in quantity to the wants of growing plants, great saving may be effected.

3. *How ought manure to be applied?* This question was briefly noticed in the last number of this Journal, when it was stated that manure is generally buried too deep in the soil. Since that time, we have met with an article in one of the monthly journals, in which the writer attempts to show that the great loss to be guarded against, is not downward but upward. And he reasons in this way. Fill a barrel, whose head has been knocked out, with sand, and pour upon the top of the sand, any kind of manure stirred up in water. After it has passed through the sand, it will be found to be almost pure water. Here the writer reasons only from the sense of sight. He has forgotten that all that is of use for the nourishment of plants is dissolved in the water and invisible, whilst the dirt which floats in it is useless, and is all that is separated by filtering. If he had examined the fluid which had passed through the sand, he would have undoubtedly found it laden with the most fertilizing properties.

The tendency of the gases produced during the decomposition of vegetable and animal matter under the soil, to escape upward, is in our opinion very slight. The soil, like all other porous bodies, has a strong attraction for some of the gases, and holds them with great force. It is a fact well known, that the carcase of an animal when covered with only a thin coating of earth, will undergo decay without tainting the neighboring atmosphere. The gases generated, do not escape into the air, but are held in the porous earth. But the rain falling upon the soil and passing through, has the power of extracting these gases, which it must inevitably bear with it in its downward passage. Nothing which is soluble in water can be separated from it by filtering, and these soluble substances are the very materials, in the proper form to nourish the vegetable. We might state some very striking facts, showing that manures in solution are carried to great depths into the the ground. Such are wells which are often rendered useless by the leaking of neighboring sinks and dung heaps.

We would not be understood as advocating the application of manures to the surface, but that they should be thoroughly incorporated with the soil on the surface, or just below, and not buried at the ordinary depth of the furrow, which should not be less than eight inches. The roots of very few cultivated crops ever reach to that depth in the soil, and consequently if buried so deep the manure is to all intents lost. If well mixed with the surface soil, it is easy of access to the superficial roots, and deeper ones are supplied by the descending water charged with their food. Thence the good effects often experienced from top dressings to crops, of well decomposed manures.

The question however, would not be answered even thus, if the opinions of those are correct, who make the atmosphere the storehouse of all the organic food for plants. If they are right, manure should not be buried at all, but suffered to decay upon the surface, where all the volatile portions would mingle with the atmosphere. We cannot, however, subscribe to the opinion that even the carbon is now or has been at any previous age of the world, derived from that source; and it might be easily demonstrated, we think, that if the present existing carbon, which is now or has been at previous periods since the creation in an organized form, were converted into carbonic acid at the expense of the oxygen of the air, an atmosphere would be formed in which no plant could exist. And we deem it only wild and groundless conjecture that either plants or animals have existed at a former period, which have not analogies at the present time, and none now exist which could flourish in an atmosphere containing a much greater proportion of carbonic acid than the present. The practice of the farmer is however correct in the main. The roots are the proper mouths of plants, and their food is taken in mostly through them. That the leaves have an important office to perform is also true, but they cannot be regarded as of so much consequence as is attributed to them by the advocates of this theory.

In conclusion we would say, that it is very important that experiments should be carefully made in regard to the use of manures, in reference to the points we have been considering, as well as others, and especially the economical employment of them. There is no doubt a great waste in the way in which manures are commonly applied. Spread over the whole surface and then ploughed in, especially if not partially fermented, their action is not confined as it might be to the crop only, and what benefit is derived from them is slow and weak. They do not furnish sufficient food to produce a vigorous growth at any one time. Their efficacy is diffused, small as it is, through the whole growth of the crop, and at best a precarious support is afforded through the whole period.

Our soils after a course of tillage, become impoverished. Must we expend large quantities of manure upon them to keep them up ? Or may we not compel the soil annually to produce all it will, till it becomes exhausted and then by the proper application of proper manures to the crop itself, still force a poor soil to bring forth rich harvests ? The example of China speaks loudly in favor of this—a nation living within itself and separated from all others—increasing to an almost incredible extent—employing implements the most rude—destitute almost of cattle and horses—and performing all their labor with their own hands—yet patiently cultivating their soil and stimulating it to productiveness, they have forced it to yield a support to a population of three hundred millions. And this they have done by adapting their manures to the wants of plants.

GUANO.

Guano has acquired a celebrity among the leading agriculturists in England and this country truly surprising, when it is considered that its introduction is so very recent. For although a specimen was analyzed so early as 1804 or 5, by Sir H. Davy, and recommended by him as a manure, yet it was not until 1840 that attention was directed to it by the excellent publications of Liebig. During that year a small quantity was brought to England, with which experiments were made testing its qualities as a fertilizing agent. So beneficial did it prove, and so sanguine were the expectations in relation to its becoming an article of considerable trade, that a company was formed for its importation. This company succeeded in obtaining an exclusive privilege from the Peruvian and Bolivian governments. Within the last five years the demand for guano has increased from a few tons to such an extent that it is estimated that in '43 and '44 there were upwards of 1000 vessels, of large class, engaged in transferring this manure from its barren places of deposit to the ports of Europe; a small proportion only was landed in the United States. Guano is confined, so far as discoveries have been made, to the west coast of South America and the southwestern coast of Africa. It occurs in beds varying from thirty to sixty and sometimes one hundred feet thick, upon the islands and rocky promontories that skirt the coast. It is the product of birds—flamingoes, pelicans, &c., which having been in possession of these islands for ages, in innumerable numbers, their droppings have accumulated to the enormous extent just mentioned. This depth is undoubtedly increased by the carcases of dead birds and seals, as the bones are found in great quantities at all depths. These birds are found frequenting the coasts and islands of all latitudes in as profuse numbers, but as rain or moisture would dissolve and render useless all deposits from them, and consequently prevent any accumulation, we find true guano confined to those regions which are comparatively free from rain. The western coast of South America is, with the exception of some few points, almost barren, consisting of rocky and sandy deserts. Almost a total immunity from rain is a characteristic of this coast, consequently the dung of the birds has been preserved in great purity. Among the deposits already opened are Iquique, latitude 20° 20′ south, Babellon de Pica, St. Lohos, nine miles south of Pica, Isle of Torricella, Islay, Jesus, the islands about the port of Arica, latitude 18° 20′ south, longitude 76° 16′ west from Greenwich, the Chincha islands in latitude 14° 23′ south, longitude 76° west from Greenwich. These last are reported as bearing beds 900 feet thick and of the best quality.

Although so lately introduced to us, yet this substance is noticed among the earliest accounts given by the Spaniards of South America. The Peruvians, and various Indians inhabiting that country have been accustomed from time immemorial to the use of guano. So great was their estimation of this manure that great care was taken not to molest in any way the birds which they were aware produced the manure. Laws were prescribed by the Incas, and heavy penalties were attached to the offence of killing the birds. They made use, however, of the recent dung only, which was gathered annually, at a certain season of the year; this is undoubtedly better and stronger than the older deposits, which have thus been left to be opened by modern enterprise. Nor is it surprising that the Indians should esteem the guano so highly.

The soil generally, as before stated, is very thin and poor, presenting almost nothing in whole districts, but barren wastes. Yet notwithstanding all these disadvantages, the natives contrived to raise good crops, and with care were always sure of an abundant return for their labors; but always with the aid of guano. By the application of this manure, fields of sand, where, only a few stunted weeds could find root, became as fertile as the richest of soils. It is said that the natives come from the interior, one or two hundred miles with one lama to obtain the small amount that animal can bear, and consider their long journey well rewarded.

The first specimens of guano were brought from the western coast of South America, and all the guano used was from this locality until 1843, when by the enterprise of Mr. Rae of Liverpool similar deposits were discovered upon the southwestern coast of Africa, and vessels were immediately despatched to this new treasure. The island of the most importance as regards quality was Ichaboe.

The extent of the manure upon this island was, in 1843, estimated at one thousand feet long, five hundred feet broad and thirty-five feet deep, containing from seven to eight thousand tons, which recent accounts state to be now entirely exhausted. Several other islands have been opened, some off Angru Peguina, but the guano seems to be of an inferior quality to the Peruvian. This is attributed to the fact that rains are more frequent upon the African coast than upon the American. It is quite probable many deposits remain as yet undiscovered.

This manure has been analyzed by some of the most eminent chemists of Great Britain. The average of those by Dr. Ure, of genuine Peruvian guano, gives

1. Azotized animal matter, including urate of ammonia, together capable of affording from eight to ten per cent of ammonia, by slow decomposition in the soil,	50.0

2. Water,	11.0
3. Phosphate of lime,	25.0
4. Phosphate of ammonia, ammonia, phosphate of magnesia, together containing from five to nine per cent ammonia,	13.0
5. Silicious sand,	1.0
	100.0

Analysis of a specimen of African guano by Dr. Ure, gives

1. Saline and organic matter containing ten parts pure ammonia,	50.0
2. Water,	21.5
3. Phosphate of lime and magnesia and potash,	26.0
4. Silica,	1.0
5. Sulphate and muriate of potash,	1.5
	100.0

Many other analyses might be given showing the composition of the different varieties, as it varies considerably from different localities, even in different cargoes, from the same deposit; but the general results of these analyses show the guano from the Pacific to be superior to the African.

In order to determine the purity of guano it is only necessary to mix a small quantity of guano with about ten parts of chalk and one part of quick lime, let them then be intimately blended, when they should give off a strong smell of ammonia; next, moisten a glass rod with muriatic acid, this held over the mixture should produce a strong evolution of white vapor. This will determine the presence of ammoniacal salts. In a crucible heat to redness a small quantity; this should reduce it to a white ash, when if good, the ash will be nearly soluble in dilute muriatic acid.

The different analyses of guano show it to be composed, in an eminent degree, of those substances considered as most useful in manures.

Numerous experiments have been made in England, for the purpose of determining the value of guano as compared with other manures; both as regards the beneficial effects upon the soil, and the relative cost of the application. These experiments have been varied and tried upon all crops raised in England and Scotland, and by scientific men, and have the merit of authenticity. The results seem to establish guano, in relation to other efficient manures, such as bone dust, barn-yard manure, &c., as four of the former to five of the latter.

The most approved method of applying guano, is to mix it with good earth—care being taken that they should be intimately blended and sown broadcast, in the proportion of about three hundred weight of the guano to the acre. Another method is to drop it in the drills; but, if guano alone is used, care should be taken that it does not come in contact with the plant, as it will kill the plant almost as surely as fire.

It should also be applied, if possible, just before the coming of rain; for if left dry upon the surface, the volatile salts will soon evaporate. Thus, in a dry season, guano has been known to fail entirely—producing no effects whatever.

The natives of South America are obliged, from the dryness of the atmosphere, to irrigate their fields by artificial means. A very beneficial mode of using is, to make a solution of guano, and let it stand in a vessel, ready for use; this will do only for garden and pot plants; although it might be pursued, perhaps, advantageously, upon large fields. Extraordinary effects have been produced in this way. One mentioned in third No. of Colman's "European Agriculture, &c.:"

"In Scotland, last autumn, two shrubs were shown to me, sweet-briars, growing in front of a two story house, and trained upon its sides; one at one, the other at the other end. The soil in which they grew, the aspect and other circumstances, were the same.

"One, in the season, had grown six or seven feet; the other nearly thirty feet! It actually climbed to the roof of the house, and turned and hung down, reaching half the distance down from the roof to the ground. I judged this could not have been less than thirty feet. This had been repeatedly watered with liquid guano, by the hands of its fair cultivator; for this was another experiment by a lady, (which I hope my American friends will bear in mind.) The other had received no special care or manuring."

The minutiæ of many experiments might be given, to show that the value of guano has not been over estimated, so far as regards its use in Great Baitain. Experiments in this country have not produced such striking results, although it has been used here with a good deal of benefit, especially on house plants.

A friend of ours has used it upon his garden vegetables, with excellent results, this season; beets, tomatoes, &c., were watered with a solution of guano, with very marked results. The proportions of the material used were, one lb. of guano to one gallon of water, and almost a wine-glass of the solution poured around each plant. A solution a little stronger than this, destroyed some of the tomatoes.. It will be seen that those who have been in the habit of using a shovel full of manure to a hill of corn or potatoes, would very likely fall into a fatal error, in the use of this substance, by excessive doses; and from facts in our possession, we are confident acres of corn have been destroyed in this way.

The belief has been expressed by some, that there was guano enough in the world that could be obtained, to supply all demands for a thousand years at least. This, so far from being true, a little reflection will show that a few years, at the present rate of its use, will serve to exhaust all deposits known of this substance; and, of course, from its source and well known mode of production, can never be renewed so as to form, hereafter, an article of commerce.

Our farmers, then, will direct their attention to other sources of manure, to supply the wants of their farms, and will not expect, at least, to obtain it in any considerable amount, after one or two years at farthest.

HOW PLANTS ABSORB CARBONIC ACID.

BY WM. PARTRIDGE.

The first number of the American Quarterly Journal, contains an article by Thomas Hun, M. D., on the food of plants, wherein he quotes Liebig, page 15, as follows—" the great value of the soil for vegetation, depends on its earths and alkalies, which seem to supply the inorganic constituents of plants. The humus or mould is comparatively unimportant, except at certain stages of vegetation, in furnishing carbonic acid to the roots."

Again, p. 17, 18—" Carbonic acid is derived from the soil, where it is generated by the decomposition of vegetable matter, and from the atmosphere. The main source of carbonic acid, is, however, the atmosphere. How can this be otherwise, when the enormous quantities of carbon which trees, the growth of centuries, for example have laid up, are contrasted with the very limited extent to which their roots extend. Very certainly where the acorn, from which sprung the oak that is now our admiration, germinated a hundred years ago, the soil where it fell, did not contain the millionth part of the charcoal which the oak now incloses. It is the carbonic acid of the atmosphere which has furnished all the rest; that is to say, almost the whole mass of the noble tree."

"But what can be more clear or conclusive upon this subject, than the experiment of M. Boussaingault, in which peas sown in sand, watered with distilled water, and fed by the air alone, nevertheless found in this air all the carbon necessary to their development, flowering and fructification."

"If then the plant is vegetating in a soil which furnishes no carbonic acid to the roots, *the whole supply must be derived from the atmosphere by its leaves.*"

I believe that Mr. Liebig is in error in supposing that the leaves, by absorbing carbonic acid, supply trees or other vegetables with the principal portion of their carbon. I shall offer some facts, which I think will go far to disprove this assertion.

I am aware that it is up-hill work to call in question any theory of Liebig's, for so great is the confidence of his readers in his opinions, that it is considered mere querulousness to call any of them in question.

I am also aware that my own positions may be erroneous. On this point, I have only one request to make, that any error I may fall into, may be shown, not merely asserted; and if the objections are well founded, I will readily acknowledge the error.

Man is a theoretical being, and those who can produce the most splendid and imposing theories, are sure to stand on the pinnacle of literary fame. It is of little consequence whether the hypothesis on which a theory is raised be well founded or not, provided it be specious, for few men are capable of testing it by the touchstone of truth; and it is so much easier to believe than to investigate, that any thing, however absurd, when supported with talent, will be sure to meet with a competent number of proselytes.

We look with contempt on the theories of past centuries, while we are deeply absorbed in those of the present day, which in their turn will become the objects of disproof by succeeding generations; but theories, like governments, will some of them leave a splendid train in their rear, whilst others will be thrown down and forgotten almost as soon as they are formed.

In tracing the operations of nature, I have always laid it down as a rule, to endeavor to discover the intentions of the Supreme Mind, in the qualities and in the appliances of the objects of investigation. In tracing the operations of carbonic acid, we find it to possess great weight, a weight much greater than any other gas; so great that it may be poured from one vessel into another, without mixing with the surrounding atmosphere. If this gas were intended to feed vegetation through the leaves, then would its ponderosity be adverse to such appliance. If, on the contrary, the gas were intended to feed plants through the roots, then would this ponderosity cause it to descend to the ground, and there supplying the necessary food by means of the roots.

The atmosphere is found by analysis to be always and in every situation the same, to afford in the diseased cell, in valleys, and on hills, the same results; yet we know that various gases are continually pouring into it; but is is evident they do not chemically combine with the atmosphere. Most of the gases are much lighter than the atmosphere; these ascend beyond our reach, and descend again in rain and snow storms. Carbonic gas, the principal food of plants, being much heavier than the atmosphere, must necessarily fall to the ground, where it would afford nourishment to vegetation. Carbonic gas is called by the miners choke-damp; and when in moderate quantities, is always near the ground. If a dog, or other animal that holds down its head, pass into it, it is immediately killed by inhaling the noxious fluid, whereas the workmen, whose heads are above the gas, sustain no injury from it.*

Were the gases suspended in the atmosphere within the reach of animals, it would soon become totally unfit for sustaining animal life. This would be peculiarly the case with carbonic gas, which instantly destroys life. How wise, then, is the arrangement of the Supreme Being in giving it such weight that it shall fall to the ground, and be absorbed by that portion of organic nature to supply whose wants it has been created.

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* Our correspondent seems here to forget the fact, of which he is certainly aware, that in all parts of the atmosphere the carbonic acid is equally distributed. The examination of portions brought from the greatest height to which man has ascended has given the same quantity as is found near the surface. This arises from two causes—first, the constant motion of the air by winds, which would mix the different gases—and secondly, the tendency which all gases have to comingle even when at rest. Thus, if a vessel containing hydrogen—the lightest of all gases—be inverted upon a vessel containing carbonic acid—the heaviest gas—and kept in a state of perfect rest for a few hours they will be found mutually diffused through each other, and this although the communication be only through a very fine tube. We say this only to correct a matter of fact, and not as bearing upon the point which our correspondent is discussing.—Eds.

Some twelve months since I gave to Mr. Maynard, who keeps a multiflora garden in Brooklyn, a number of papers, each containing from one to three scruples of supercarbonate of ammonia, and requested him to apply them to his greenhouse plants; to a small pot one scruple, to the largest three scruples, and to inform me of the result. In a short time he called on me to notice its effects on a hydrangea. I found the leaves were of a deeper green and larger than any others, that the flowers were larger, of a richer color, and every way superior to all others. The contrast was so striking, that all who saw it were desirous of purchasing that plant at an increased price. Now as one pound of supercarbonate of ammonia can be bought at twenty cents, and is sufficient for one hundred and twenty-two plants, I know of no application that is cheaper, and certainly none so efficacious. This fertilizer was stirred into the soil—a proof that the carbonic gas was taken up by the roots—thereby producing its rapid and beautiful effect. This salt contains about fifty-five per cent of carbonic gas.

Mr. Steane, apothecary and chemist, 184 Fulton street, Brooklyn, informed me that he applied some to a rose plant, which appeared to be drooping, and that he could see the spongioles of the roots come up to the surface and take it down. My attention was first drawn to this effective fertilizer by an observation made by Mr. Steane.

I requested Mr. Leeds, an amateur in greenhouse plants, druggist, corner of Atlantic and Court streets, Brooklyn, to apply some of the salt, in solution, to a rose plant that appeared in the last stage of decay, having lost its leaves, and collected a large excrescence at the roots. He dissolved about two scruples of the supercarbonate in an eight ounce phial of water, and gave the plant a little every day. In a short time the buds began to appear, and the last time I saw it the plant had produced some full grown leaves, and a great many buds were putting forth.

Mr. Leeds has had a monthly rose in a large glass jar, planted in the usual soil. This jar is hermetically sealed, and yet the plant has flourished, its leaves being of a healthy green, and it grew faster and blossomed sooner than any similar plants exposed to the atmosphere. It is evident that this rose tree obtained its food from the soil in which it was planted, and not from the atmosphere. It has been kept several months in this state, and I presume will flourish so long as it can be supplied with sustenance from the soil.

I know not how others may construe the facts I have given; but I view them as conclusive evidence against the theory of Liebig, "that the carbon of the plants is principally obtained by the leaves absorbing carbonic gas." Nor do I consider the experiment of Boussaingault as affording the least proof in favor of this theory, as the result would be the same whether the carbonic gas of the atmosphere where taken up by the roots, or absorbed by the leaves. Mr. B. must have known, I presume, that sea sand has generally more or less of broken shells in it, and that silicious sand usually contains about four per cent of carbonate of lime as one of its components.

Before quitting this subject I would suggest a new application to those who keep greenhouses—one that I believe cannot fail to produce a very decided improvement in all their plants; and as the cost will be but trifling, I am confident will be applied by some amateur; and should the result answer my expectation, will soon be universally employed. I would suggest that an apparatus be placed immediately outside of the greenhouse to engender carbonic gas, that the gas be passed through a tube into the greenhouse of an evening after closing up for the night. Any vessel, either stone ware or metal, would answer the purpose, there being no resistance to the delivery of the gas. Some machine can be placed at the end of the tube, inside the house, like a ventilator, by which means this ponderous gas could be thrown over the whole mass of plants. It would be a cheap operation, as nothing but chalk or limestone, and oil of vitriol water, would be required to engender the gas. In discussing this subject at a meeting of the Brooklyn Natural History Society, our venerable president, Augustus Graham, Esq., suggested that the burning of charcoal inside the greenhouse might answer every purpose, and as this would be the most simple and least expensive, it would be well to give it a trial.

AGRICULTURAL SCIENCE, EDUCATION, &c.

BY N. S. DAVIS.

The present age is generally characterized as one of great, nay, of unparalleled progress in every thing pertaining to man's physical, moral, and intellectual condition. For while space and time are alike robbed of their ancient powers, by the steam engine and the electric telegraph; the almost numberless schemes for social reorganization, and the *quite* numberless plans for universal intellectual cultivation and education, each and all represented by their respective advocates as capable of elevating the whole race, and speedily ushering in the millennial dawn with all its resplendent glories, would almost make us forget that more than four thousand convulsive, struggling, heaving, toilsome years have rolled away since man began his career on earth, and still three-quarters of that earth is covered with darkness, moral, physical and intellectual, darker even than at the beginning; while of the inhabitants of the remaining quarter, not one-fourth have ever caught even a glimmering ray from the light of science, or a sip from the Pierian spring. And yet this fact, plain and palpable as it is, should make us hesitate and reflect, before we attach too much importance, or look too sanguinely to the results of any of the thousand schemes for ameliorating the condition of mankind. We would not deny our faith in human progress; neither would we say a discouraging word to the warm-hearted philanthropist, who, in the ardor of his zeal, would regenerate a world in a day, if he, like Archimedes, could only find a fulcrum on which to rest his lever. But we would look at the past and learn to be humble.

We acknowledge that the present is, in a moral and physical point of view, an age of convulsion, innovation and change, if not of improvement. It is a time when, on the other side of the Atlantic, the deep, and ever deepening tones of misery from long oppressed humanity, are rising with volcanic power, beneath the tottering towers of regal tyranny, and demanding redress.

And in our own boasted land, there seems to be a spirit of restless innovation in all the relations of man, which portends the near approach of an important era in the history of our race. But why all this restlessness? Why this clashing of interest with interest—of section with section? Why this mingling of wealth and poverty; of merry huzzas and oppression's wailings; of ignorance and knowledge; of degrading vice and exalted virtue; of endless struggles after the most exalted attainments, and the tamest submission to indolence and physical degradation. Alas! we fear it is because we have yet to seek out and establish a system of legislation and *education* which will develop all the powers of man. But we are widely digressing from our object, which is simply to offer some suggestions on a subject of engrossing interest, at the present moment, in our own State; and which we are glad to find occupying a conspicuous place in the American Journal of Agriculture and Science, viz: the agricultural education of the present and rising generation of our own citizens. There is, probably, at the present moment, a greater sacrifice of time, labor and money, in the cultivation of the soil, than in any other department of human industry. Of this, every intelligent observer is fully aware; and hence the imperious demand which has gone forth for the speedy application of an appropriate remedy. Through the agency of state and county agricultural societies, an interest has been awakened in this subject, which pervades, to some extent, every township in the State. Concerning the nature of the remedy to be applied, there is, also, no dispute. All agree that it consists in the application of scientific knowledge to practical farming.

But concerning the time, place and mode, of preparing our agricultural population to make such application, the greatest diversity of opinion exists. One says, give us a state agricultural school, with a model farm attached, supported from the public treasury, where the science and practice of farming can be taught at the same time, to young men from every part of the State. Another says, away with your great drains on the public treasury—only popularize the study of science—banish your *technical terms*, and give us text-books in the true vernacular tongue, and the district schools will be fully adequate to our wants. While a third discards both of these, and points to the numerous academies distributed over the State, as the only proper place to commence and carry on this much needed work.

That there is a strong and perhaps increasing feeling in favor of the establishment of a well endowed State Agricultural chool the transactions of the State Agricultural Society, and the doings of the State Legislature during its recent session, as well as the published opinions and addresses of individuals, abundantly show. But would such a school fulfil the expectations of its friends? Would it be able to call the class of young men on whom we must rely from remote sections of the State to any one location which can be chosen? Would it diffuse the greatest amount of agricultural science among the people with the least expenditure of time and money? Finally, would it be able to maintain a permanent existence amidst the endless changes of party, and fickleness of legislation which characterizes our State?

Doubtless if such a school were established, with an expenditure of money sufficiently lavish, not only to make the tuition free, but also to pay the greater share of the board for those who would attend, a respectable number could be gathered in from some quarter. But we may seriously doubt whether it is necessary, in this country, to hire our youth to be educated. And even if it were, we believe a more economical mode of doing it could be devised than this. For the annual appropriation of $8,000 or $10,000 to sustain such a school, would well sustain a separate professorship in at least ten institutions already established in different parts of the State, and thereby extend instruction to more than five times the number that could be gathered into one place. But we are told that a model farm is as necessary as a school; and that the theory and practice of agriculture must be taught together, and therefore a State institution is necessary. A model farm, if we understand the term, is a tract of land on which the various branches of husbandry are carried on according to the strictest principles of science. But where shall it be located? in the valley of the Mohawk or Genesee, or on the hills of Herkimer? Shall it be on a sandy, clayey, or alluvial soil? We are very much inclined to think that a model farm in one location, or on one soil, would be very different from a model farm in another and on a different soil. It is true, the same principles might govern the practice in both places, but the difference in the circumstances under which they would be applied would make a wide difference in the practical aspect of the farms. Again we doubt the propriety of thus attempting to connect the study and practice of agriculture in a school designed for youth. For what is the real object of education, whether general or specific, legal, agricultural, or medical? Is it to learn a routine of forms, recipes, and arbitrary rules, or is it to expand and discipline, and then store the mind with principles and facts?

If we wished a young man to become eminently qualified to practise law or physic, we should by no means send him to Yale College to write out blank deeds, mortgages, &c., or to New-York University to make pills. But we might with propriety send him to these seats of learning for the purpose of giving him a complete and profound knowledge of the principles or general rules, and facts which constitute the basis of all intelligent practice in either of these professions. Precisely the same rule applies to an agricultural education. Take the young man whose mind has been developed and disciplined by a thorough study of the elementary branches of education, and teach him the principles or laws which govern the decay or decomposition of vegetable and animal matters, for example, and if he possess an ordinary share of common sense he will never be at a loss to find some mode of applying those laws to the practice of preparing barn-yard manure. These laws teach him that in all such cases much gaseous matter is formed which must be retained by some absorbent; also that caloric or heat is developed which must not be allowed to rise too high; and finally that the most valuable products are soluble in water, and therefore liable to be washed away and lost by rains, &c. And hence he will not need a model farm to teach him that a cover of some kind is necessary for the protection of his manure. But whether that protection shall be a barn cellar, or a shed, must depend on the situation of himself and his barn. We believe one of the greatest errors in the present popular idea of education is, that it must be *practical*, meaning thereby that it must consist in the study of such things only as are directly reducible to practice in the ordinary pursuits of life. Such an education is directly the reverse of practical, in any proper acceptation of that term. It may indeed make a man of prescribed rules, and forms, and routine; the mere *creature* of circumstances.

But the really practical man, is one who makes rules, forms, and circumstances his creatures, and himself their master, to change and mould them according to his will. To do this he must be educated to think: and to be capable of deep, continuous and expansive thought, the mind must be disciplined by the patient and thorough study of all the elementary branches of science. For practical purposes, a fully developed and well disciplined mind is of infinitely more value, than all the skimming, steam pressure models of development which can be devised.

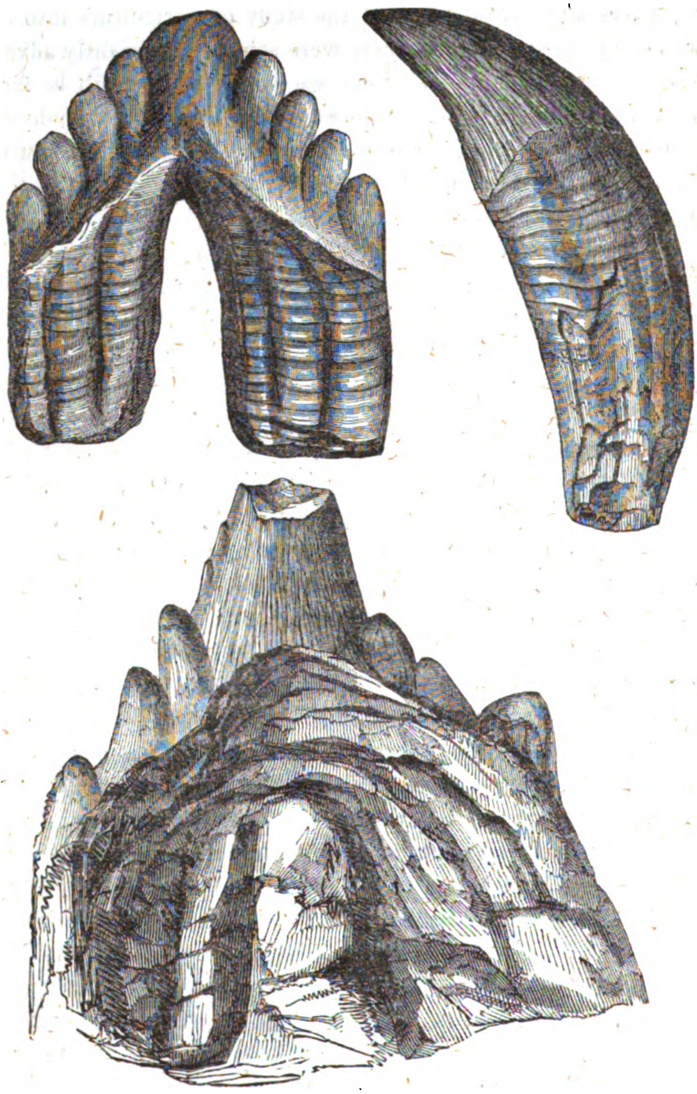
But we again digress from our object. We not only think the establishment of a State Agricultural School bad economy, and not well calculated to answer the expectations of its friends; but in the present unsettled state of the public mind, and the sleepless jealousy with which it would be viewed by a respectable portion of citizens, renders it very doubtful whether it could maintain an existence beyond the political lifetime of its founders. The opposite idea that any process of simplification in regard to text-books on agriculture, can render the district schools alone adequate to the wants of our agricultural population, is also fallacious. There seem to be some very indefinite notions, even in high places, concerning the condition of a great majority of the district schools in our country. Thence we hear men of high standing talking about catechisms of agricultural chemistry and geology, so simple as to be readily comprehended by "every child of twelve years old," and therefore "admirably adapted for study in the common schools of the State." But do such men know that nineteen-twentieths of the children in our district schools, at the age of twelve years, have scarcely commenced the elementary studies of geography, arithmetic and grammar. Surely not, or they would never be talking about introducing to their notice the complicated and extensive study of agriculture. Such children might indeed learn their catechism of agriculture in the same way that we formerly learned our catechism of Theology; that is, as the parrot learns to say "*pretty Polly*," but who would be the wiser thereby? Now, we say, with all due deference to high authority, sustained as it may be by the *five* Irish prodigies from the Larne school, that agriculture is a science requiring a discipline of mind, and a power of thought and reflection for its useful comprehension, altogether beyond the capacity of *any* boy of ten, *twelve*, or fourteen years of age. And hence to urge such a study upon them would only serve to divert their attention from those indispensable elementary studies which ought ever to form the foundation of all education.

There is, however, in all our district schools, a *small* class of more advanced scholars, who have arrived at a more mature age, and whose attention cannot be turned too speedily to the careful study of agriculture as a science. But we should object to placing in the hands of this class a text-book on any science, simplified and diluted down to the capacity of *babes* and *sucklings*. For we hold to the doctrine of St. Paul, that when children, we may think and speak like children; but when we become men, we should put away *childish* things.

We are continually prone to consider education as little else than a loading of the memory with words and facts; and hence the more brief and simple these are rendered, the better, because the easier for the memory to retain them. The acquisition of facts is indeed necessary; but it is equally necessary that the judgment be developed; the powers of reasoning, the ability to compare fact with fact, to seize on circumstances, however varied, and wield them for the accomplishment of a given end. In a word, the agriculturist not only needs to understand the facts and principles of the science, but he must have a judgment as fully developed and well trained to apply those facts and principles under all the various circumstances which the earth presents, as the legal advocate at the bar, or the judge on his bench. To think of thus strengthening, maturing and disciplining the youthful mind, by the excessive simplification of text-books, is very much like teaching a child rhetoric by repeating to him *baby talk*.

But technical terms, at least, must be banished. If we mean by technical terms, merely long, high sounding words, meaning nothing, then we also go for their banishment. But if we mean thereby the names which make up the nomenclature peculiar to a particular science, as the names of oxides, alkalies and acids, in chemistry, then we totally object to this innovation also. For instead of being a hindrance to the learner, they are nearly all so arranged as to indicate either the composition or properties of the substance named; and hence, to learn their names is to a certain extent to learn the science itself; and to banish them for others in common use would be to go, at least, one century backward in our progress. Thus, suppose we set the student to learning the common names of oil of vitriol, copperas, plaster of Paris, or gypsum, glauber salts, &c., &c., he not only gains nothing beneficial, but he suffers a positive loss in acquiring at least two or three false ideas. For who ever spoke the name copperas, without receiving the impression that copper entered into its composition, or plaster of Paris, without the thought of its coming from Paris. On the contrary, sulphuric acid, sulphate of iron, sulphate of lime, and sulphate of soda, are names not only more easily learned, but every one of them indicates the composition of the thing named. Besides, we should remember that all names, whether common or technical, are alike new, and to be learned by the scholar. Hence, he would not only gain nothing, but positively lose much by the proposed banishment of names. But we have perhaps already extended our censorious remarks too far, and the reader may be ready to inquire what we *would* do, and how we would do it? Doubtless the first thing to be done is to prepare teachers for the work. For this purpose the study of agricultural science should be immediately introduced into the state normal school, and into all those academies where young men and women are trained for district school teachers. Again, at every session of the teachers' institutes, in the several counties, suitable persons should be engaged to give a course of lectures, exhibiting in plain and familiar language the nature and importance of the study, and the best modes of illustrating it. To accomplish all this, those who send young men to our academies and teachers' institutes, have only to ask it, and it will be done. For all these institutions depending on their patrons for support, will never long resist the expressed will of those patrons in regard to any particular study. Let this be done, and its introduction into all those district schools where there are scholars of sufficient age and attainments, would follow as a matter of course; and then the whole work will have been accomplished. It will be seen that we ask for neither new legislation, nor aid from the public treasury. And why should we? There are already academies, seminaries, institutes, scattered over the state, almost within sight of every man's door; and all entirely subject to the control of the people. Then would it not be infinitely easier, more economical, and wiser, to make these what they should be, than to thrust them aside for the establishment of new ones, involving the expenditure of thousands of dollars. Indeed, we are sure that half the money and less than half the number of speeches which would be required to get a law for the establishment of a State Agricultural School through both branches of our legislature, would, if judiciously applied, procure the successful introduction of the study of agriculture into every school in the state, where there were scholars sufficiently advanced to study understandingly. But we hope the day will be far distant when the science or profession of agriculture, or indeed any other profession, shall be urged upon the minds of our youth *before* they have laid broad, deep, and thorough, the foundation of a good general education.

Binghampton, June 6, 1845.



Teeth of the Zeuglodon.

ON THE SUPPOSED ZEUGLODON CETOIDES, OF PROF. OWEN.

BY ONE OF THE EDITORS.

In 1843, I received from Alabama the vertebra of a large fossil animal, supposed to belong to the same species which had been described by the late Dr. Harlan, in 1832, under the name of Basilosaurus; and in 1839, was described and refigured by Prof. Owen, under the name which stands at the head of this article. These bones had remained till this spring in the boxes in which they were packed, but having time and opportunity to give them an examination, I took them from the boxes and placed them in the State geological rooms. I then commenced removing the matrix or rock in which the parts of the head were enveloped. In the performance of this work, I soon perceived that the teeth were quite dissimilar to those of the animal which had been described, first by Dr. Harlan and subsequently by Prof. Owen. The teeth, as will be seen by the annexed cuts, (by those who have seen the drawings of the above named gentlemen,) are very unlike theirs; and indeed, it seems impossible that these differences should arise from imperfection in the specimens, inasmuch as most of the broken teeth in my possession exhibit the peculiar forms I have represented, either by themselves or the casts upon the matrix. Besides, the figures in the London Geological Transactions represent the margins so entire in all the specimens of the teeth there figured, that provided Dr. Harlan's animal was the same, this peculiar margin could not have existed. For these reasons, I am very much inclined to believe that the animal in my possession is quite distinct, especially when it is taken into the account that the Zeuglodon had a long tail and a short neck, in which last characteristic it was supposed to have been similar to the Dugong; whereas, these vertebræ demonstrate, that the animal had a short thick tail and an extremely long neck, the heavier portion of the animal being towards the posterior extremity. In form and model, therefore, it resembled, generally, the Pleiseiosaurus, as represented in the restored skeletons. It is true, that it seems not a little remarkable that two such enormous animals should be found existing upon the same plantation, still that is a matter we have nothing to do with except to describe accurately what we find.

But the very interesting and important observations of Prof. Owen, on the anatomical structure of the Zeuglodon, apply also to many of these bones, viz: the solid double fangs of the molar teeth—their implantation in separate and distinct sockets; and to the jaw, which is hollow.

But some other important facts I have been able to determine by the specimens in my possession, viz: the convexity of the condyle, the inward curvature of the angle of the jaw, which projects beyond the condyle, in a manner not very dissimilar to that of our hystrix. The angle, the condyle and the coronoid process of the lower jaw, then, all form one continuous portion of bone; thus proving very conclusively that the animal did not possess a jaw of the composite kind or structure.

It would be interesting to institute a comparison of the jaw of this animal with the Thylacotherium, unless indeed, the jaw of the latter is supplied with molars too far removed in form and structure to furnish grounds for the admission of affinity—but in the figures which are given in Buckland's Bridgewater Treatise, the molars are not very dissimilar to those of the seal family.

There is another fossil whose teeth, especially the crowns, resemble those in my possession; I allude to the Iguanodon. Both have serrated edges, but with this character the resemblance ceases. But as the Iguanodon is supposed to have been a vegetable feeder, this resemblance is interesting, inasmuch as it may throw some light on the nature of the food of our animal; but still, it is supplied with large canine teeth, so as seemingly to balance the probability of its feeding upon vegetables. Connected too with the bones of the head, is a large rounded bone, like the palatine bones of a fish; a provision for a more perfect mastication than could have been made by the cutting grinders as represented in the figures,—provided that this palatine really belonged to the animal in question. It will be seen from the above facts, that we have some very interesting combinations—some anomalies which are quite as rare as any which have been furnished since the discovery of the remains of the sauroid fishes.

I now proceed to the main object of this paper, viz: to describe the teeth of the animal under consideration.

1. Teeth of two kinds; molars and canine. The first ar e has tate, or of the general form of an arrow-head, or of a spear. This form, however, appears under a modification, as will be seen by reference to the figures. The second variety is that of the ordinary canine tooth, or tusk. Molars, greatly compressed, margins serrated or lobed, and edged, terminated by a middle central lobe and rather rounded, and standing directly over the arch formed by two solid fangs. Cementum, (enamel) extending over the crowns and fangs, but thickest up the crown and but slightly wrinkled. The transverse wrinkling upon the fangs (see fig.) appears only when the first coat of cementum (enamel) has scaled off. Fangs superficially grooved, grooves varying in number on the two sides. The number of lobes, or crenatures vary: in the one figured, there are four; yet in another tooth only three can be seen, and in the lower tooth which stands by itself, there are three only; but the middle lobe is serrated on the anterior edge as in the figure, and it stands obliquely to the arch upon which its base rests, or in other words, backwards. Fangs nearly parallel with each other.

Canine tooth solid, compressed, tapering towards each extremity, widest just within the alveolus, or socket. Cementum finely wrinkled longitudinally over the part external to the alveolus, but extends thinly over the fang, concealing the transverse wrinkles. A shallow, wide groove on one side, of the fang extends to the lower end, on the opposite side; it is traversed by three or four narrow but shallow grooves with intervening ridges.

Measurements.

Largest molar, 3½ inches wide at its insertion into the alveolus, or jaw; 2¼ inches high from the bifurcation to the termination of the middle lobe. Canine, 5 inches long and 1½ in its widest part.

Distance between the first and second canine, 2 inches; between the second and third canine, 2½ inches. Breadth of the jaw at the insertion of the second canines, at their inside insertions, 3 inches. Height of the jaw from the angle to the top of the coronoid process, 13 inches. The passage for the spinal marrow of one of the cervical vertebra has a transverse diameter of 4½ inches, while the vertical is only 2½.

It is difficult in the present state of our knowledge to determine whether this animal, whose teeth have been particularly described, should be considered a distinct genus, or species, from the one described by Dr. Harlan and Prof. Owen. If the figures given by these gentlemen are correct, then there is no doubt of ours being quite a different animal and ought to receive a distinct designation. But the vertebra and ribs figure, by Prof. Owen, are accurate representations of ours, and taking all circumstances into consideration the writer strongly suspects *it is the same animal* ; and, admitting that the teeth have been described and figured so imperfectly before and that they cannot be identified as parts of the animal to which they belonged, still we should not, in this case, wish to change the name. To Prof. Owen belongs the merit of pointing out the position which this animal holds in the animal kingdom, and the name *Zeuglodon* is a good one, though the specific name *cetoides*, is questionable. This we infer from the great length of the neck. Of the bones beside the vertebræ, we have a femur, a humerus, and the ulna and radius, with a portion of scapula; a portion of an enormous pelvis, several ribs, two or three bones corresponding to the wrist, and both extremities of the lower jaw and the extremity of the upper jaw and many other fragments of some importance. The vertebræ extend in a line about 65 feet. We shall give in the next number drawings and descriptions of such as are the most important.

Before we close, it is proper to notice Dr. Gibbes' new fossil teeth described in the proceedings of the Academy of Natural Science of Philadelphia. The general form of these is much the same as those figures we have given. Two important differences, according to the description, exist. Dr. Gibbes' teeth are all hollow, which denotes an approach to the saurian type; the angle of bifurcation of the fangs is quite different; the fangs of his teeth stand out at quite an angle; while in mine the fangs are nearly parallel. If from any accident then, the teeth described by Dr. G. lost their interior, or were solid, this evidently would make them two different species. If those teeth were solid, there is such a resemblance in the teeth that the animals to which they belonged were of the same genus, but of different species. Then again, Dr. Kock, who has been to Alabama for the express purpose of procuring these bones, believes that his are entirely different from those in our possession, and this may be so. The formation to which these fossil bones belong, is the superior portion of the cretaceous group. All the fossils, with one or two exceptions, belong to this formation and not to the Eocene, as has been supposed. Among them are, anthophyllum atlanticum, plagigostoma dumosum, modida cretacea, etc., all of which will be noticed in a succeeding number. A few particles of the green sand are disseminated sparsely through the matrix. The order of beds associated with the zeuglodon stratum, is as follows: 1, alluvium; 2, nummulite beds, 40 feet; 3, ferruginous layer, 1 foot; 4, zeuglodon bed, from 5 to 10 feet; 5, lignite; 6, beds of clay with sharks' teeth and leaves of dicotylednous plants; 7, lignite; 8, beds with abundance of oyster shells, 70 feet—this is represented as a hard rock; 9, green sand and marle, material soft, 10 feet. This section was furnished by Dr. Kock. We had, however, previously been able to determine the age of the zeuglodon from the fossil in our possession.

FARMERS' MISCELLANY.

HUSBANDRY IN CENTRAL NEW-YORK,

In letters to John Coen, Esq., of Albany. By one of the editors.

I. Hop Culture.

Waterville, May 23, 1845.

My Dear Sir—I know that you will agree with me when I say, that what a man tells us in a set speech is comparatively of little consequence; at least, it is worth much less than what he tells us in his daily and familiar intercourse, for in the latter case he is less disposed to make a display, and has fewer motives for exaggeration. The best way to get knowledge is to visit him on his farm, or in his workshop. We then see how he handles his tools, what he really produces, and how labor and strength may be applied to the best advantage, or so as to secure the most profitable result. If he is a mechanic, his shop tells a true story of its owner. If he is a farmer, his fields and his flocks are witnesses; and no palaver of words can conceal his defects, or hide and cover up his ignorance; if he is a slouch or a sloven, they show it; if he is a man who is up and doing with the dawn, they declare it. It is a poor place for a farmer to discourse largely on the beauties and profits of scientific farming, when his corn is smothering with pig-weeds and thistles; or his onion beds are growing up with burdocks. The unmentionable one might just as well attempt to prove himself a pious man, or a rhinoceros that he is a beauty, from the length and shape of his snout, as such an one to say that he is a good farmer. If you see him at his plough, but only scratching the epidermis of his corn field, instead of going into its bowels, you may surely make up your mind that he is either a very worthy member of the society of lazy fellows, or else is totally ignorant of the value of the subsoil itself. Impressed with the truth and importance of these sentiments, I determined to visit some of the leading farmers in central New-York, that the various branches of husbandry might come under my own inspection, and as you have manifested so much interest of late in farming, and are introducing the improved modes of culture, I determined I would occasionally give you the results of my observations. I left Albany on the 22d of May, and made a continuous journey to Utica, or into the heart of Oneida county, where my observations commence; and here I remark, that Utica and its immediate vicinity is underlaid by a peculiar black slate, eminently subject to decomposition. The soil thus formed is distinctly argillaceous, but is unquestionably excellent of its kind. Passing up the valley of Oriskany creek, in the direction of Sangersfield, a succession of rocks is passed over, comprising the entire Clinton group, which consists mainly of thin bedded shales, passing into sandstones, and upwards through other silicious deposits, until we reach the Onondaga limestone, which passes through Sangersfield, Madison, Waterville, and thence westward through a belt of country five or six miles wide, to Lake Erie. The modifying influence of the different rocks is not very distinctly seen at all places, in consequence of the thick beds of northern drift which are spread over some fields to the depth of one hundred feet. In this section of country diluvial hills are constantly met with, and it is by their formation that the country is of that character which is denominated rolling. They are sometimes conical, and sometimes in the form of low, rounded ridges, forming in all those cases excellent lands for pasturage, and in many instances, land well adapted to tillage, and particularly the growth of corn. Although I have remarked that the influence of the underlying rock is not always perceptible, yet, in the region of Sangersfield and Waterville, and a belt of country from six to fifteen miles wide extending east and west, we have to all intents and purposes a calcareous soil. It is produced by an immense number of boulders and vast quantities of sand and gravel, in which there is a large proportion of calcareous matter. The calcareous matter is derived partly from the Trenton and lower limestones which form the surface rock in the northern part of the county, and the Onondaga limestone which underlies a part of the southern towns. Many excellent farms lie along the valley in the route from Utica to Waterville, but as

I was obliged to take passage in the stage on account of the rain I was unable to learn as much of the character of the soil as I wished. I was quite fortunate, however, and fell in company with a gentleman, Mr. Gurdon Avery, of Centreville, who has been engaged in the hop culture over twenty years. From him I received a polite invitation to visit his vineyards and see his mode of culture. Accordingly, the next morning I went through all of his fields, and became intimately acquainted with the whole management of this vegetable, until it is fully prepared for our neighbor, John Taylor's big stew-pan, where I propose to leave it, not being yet sufficiently acquainted with the rather mysterious process of converting it into a kind of drink commonly called beer. The hop, I will just say is rather a difficult article to cultivate, or I may say difficult to bring to a high state of perfection. Any person, to be sure, can grow a vine at the gable end of the house, where my grandmother always had one growing, or in some corner of the garden, yet it is quite another thing to cultivate from two to ten acres and secure a good yield, and bring the produce out in a merchantable state.

There are two principal departments in the hop business; first, its cultivation, and second, its preparation for market:

1. *Its cultivation.* Hops require a rich, calcareous loam, light, loose and deep, which will permit the roots to penetrate deeply and widely in search of food, that the vine may grow rapidly in the first part of the season; for the more vigorous the start, the better the hop and greater the yield, all things being equal. The field on which hops are to be sown or planted must not have been under the culture of this plant for at least twelve or fourteen years. The field, if it is in turf or green sward, must be ploughed in autumn. Early in the spring let it be manured with rich barnyard manure, and ploughed again. Early in April as possible, layers or slips of the hop are planted in rows six feet apart in one way and eight in the other. This year it is not expected to get a crop of hops. The field in the intermediate spaces is planted with corn, and the vines are suffered to run about the ground or on to the corn as they please. Early the next season, however, the field, as soon as it is sufficiently dry is broken up with the cultivator. The cultivator for this purpose requires a set of teeth about two inches longer than that which is used for corn. This being

finished, the next step is to set the poles, using for this purpose an instrument like a common bar, but which bulges out into an oval form at the lower end, the largest part of which is about two inches in diameter. Two poles, about fourteen to sixteen feet long, are required for each hill, and they are set about eighteen inches apart. The combined strength of both is necessary to support the weight of the vine securely. The hop comes up in numerous shoots, and when some of them are eighteen inches they require to be well hoed, and at the same time two of the most thrifty are secured to each pole by a woollen thread; the others are suffered to grow a while, or until the cultivator is sure that the two selected will prove to be good vines, or have escaped some dangers incident to the young state. The other vines are then broken off at the root, or four only allowed to grow. Usually the proper time for extirpating the supernumerary shoots is when the selected ones are six to eight feet long; these then receive the whole strength of the root. The weather most favorable for the growth of the hop is that which is warm and showery. Cold, dry winds are unfavorable, or those which have now for some time prevailed.

The hop requires hoeing five times in the season. It must be kept free of weeds; and this you will see is quite essential, as no weeds ought to ripen in fields which are cultivated for successive seasons. The best poles are white cedar, and they should be two and a half to three inches in diameter at base. Such poles cost from ten to twelve dollars per hundred.

The time for picking hops is when the flower is perfect. The aroma and medicinal properties of herbs are in perfection at this stage, and so is grass, which is the true and proper time for cutting, to secure it in its highest state of perfection. In the case of hops it is quite essential that the whole crop should be secured while in this state. In large vineyards, therefore, many hands are required to secure it before it passes the perfect stage. The picking is usually performed by females, and this part of the work requires neatness; stems and leaves or vines should not be mixed with the hops.

To secure the necessary neatness as well as uniformity in picking, Mr. Avery uses a large wooden box divided into four equal compartments; the box is supplied with four arms, one at each corner, for transportation.

As the hop is picked, it is carried to the drying house, where it is cured. This constitutes the second part of the business of hop growing.

The drying house consists of one and a half stories. The upper story is for spreading the hops, and the lower for furnaces. The furnaces which Mr. Avery has found after a great many trials to be the best, are constructed somewhat like a large oven, but hopper shaped; the base opens upward, so as to permit the hot air to communicate with the hops above. Mr. A. has four rooms side by side of twenty-five square feet each. The floor of each room is covered with gauze of hemp, with meshes which are one-twelfth of an inch in diameter. These form the surfaces upon which the hops are spread, about four or five inches thick. To supply the hot air, good maple coal is the best material. It is burnt in furnaces below, in one or two shovels full at a time, and such a bed kept burning in the six furnaces for twenty-four hours is sufficient, to dry thoroughly a charge of hops. The hops are then removed through a lateral door, into another room below, where they are strongly pressed in bags like bales of cotton, when they are ready for market. The labor attending their culture is not yet finished; the poles require to be arranged for winter. This is effected by stacking them on the field. They are brought from a number of hills and placed with the large end slightly in the ground in a leaning position, in a circle. The tops are brought together and then bound by the refuse vines, by which they are secured against winds. They must never lie upon the ground as they would decay much sooner than if preserved in an upright position.

The present price of hops does not vary much from seven to eight cents per pound, formerly they were worth twenty-five cents.

Hops may be continuously cultivated on the same field for ten or twelve years. By this time a grub which feeds upon the root has multiplied to such an extent that the whole root has become diseased, and incapacitated to fulfil its functions, and the crop necessarily fails. There is no other reason why its cultivation might not be continued longer, as the soil is manured every year, and preserved in a rich mellow state. The hop, therefore, leaves the field in a good condition for corn, which usually succeeds, and may be continued two or three years in succession. The worm which has destroyed the hop root does not attack corn or barley, nor any of our cultivated vegetables.

I shall not attempt to add any thing more, for I fear I have already tired your patience.

I say at once, therefore, that I am

Yours now and ever,

E.

II. Cortlandville, and Randall's Farm.

Cortlandville, May 27.

My Dear Friend—I write you, as you perceive, from Cortlandville, one of the finest villages in central New-York. I came here Monday morning, having spent the Sabbath at De Ruyter. By the way, I may state (though it is perhaps out of season by the time this is received, to speak of the weather) that Saturday passing through Georgetown on my way to De Ruyter, it snowed, but not sufficiently to whiten the ground, though it was quite cold and uncomfortable even with an ordinary winter dress. But Sunday morning, May 25th, there was a hard snow-storm; the whole country, both hill and valley, was white; still the fruit was not injured; but subsequently the more tender fruits, such as grapes, were killed, together with beans, corn, &c., which were cut to the ground.

Cortland is situated in a pleasant plain, with sufficient variety of surface to give beauty to a landscape. The plain is bounded by imperfect terraces, as if formerly it had been occupied by a lake, which has been drained by a passage through the southeastern hills, in the direction of Onondaga creek. To the southwest, the valley extends six or eight miles, forming an excellent farming country, with meadows and hills which are adapted to most kinds of husbandry. Two or three miles in this direction, are some very important deposits of fresh water marl. These are, however, at the bottom of a very interesting chain of small lakes which drain to the north. The marl, as you well know, is very valuable for farming purposes; it is extremely fine, white and beautiful, and is burnt pretty largely for domestic use, being dug out in summer when the water is low, and then moulded, like brick, and laid up in kilns and burnt, precisely like brick. The value of these marl beds has not been appreciated as yet, inasmuch as none of the farmers in the neighborhood have used the material upon their lands. The subsoil of Cortland is a gravelly drift, pervious to water; though the soil cannot be said to be leechy. The surrounding hills are well rounded, and extremely well adapted to all kinds of farming except wheat, which for several years has not been cultivated extensively. Cortland, you will perceive, is south of the wheat shales and limestones; and among the drift, there is not a sufficiency of calcareous gravel, nor of the debris of shale, to give character to the soil. It is therefore made up of the harder sandstone rocks, and the shales of the rock beneath, which is almost entirely destitute of lime. I may here say that it will come to this finally, that farmers in this part of the State will require lime and ashes to renovate their lands. Springs of excellent water gush out in numerous places in the plains about Cortland; but it is an interesting fact, that in the southwest extension of the valley, it is quite difficult to procure water, probably in consequence of the drainage towards the village, or to the northeast, and the depth of the pervious stratum of drift. Farmers should always have an eye to the drainage of the country, and they should be able to determine in connection with this point, whether there is an impervious stratum near the surface, to throw out the water. This is very essential where there are no living springs in the immediate neighborhood of a proposed settlement. It would please me in this connection to speak of the excellent social and religious qualities of the people of Cortland, but it is rather out of my sphere of observation, which I have prescribed myself. It is proper to say, however, that Cortlandville, as well as Homer, a mile and a half northwest, are settled mostly by New-England people, and have all their institutions in the most flourishing condition—churches, schools, academies, &c.

Immediately after my arrival, Judge Bartlett, our present Senator, gave me a warm reception, and though laboring under ill health, took me in his carriage to all the interesting spots within six miles of the village, and what was worthy of commendation, waited with great patience for me to gather the rocks and their characteristic fossils, and which it may be well to say, are those of the Chemung group.

As soon as I had taken this general survey of Cortland, I waited upon our mutual friend H. S. Randall, Esq., whose elevated and correct views of education, joined to his activity as county superintendent of common schools, has secured him a fame and honor which extends beyond the bounds of the State. But it is as an agriculturist that I visited him, and it is in this sphere I shall speak of him. But I will only say at this time—as I have already spun a long yarn—that his farm is one mile from Cortlandville, and is sufficiently elevated to overlook the village, and from it you have a fine landscape, though not sufficiently bold to call forth strong admiration; it is beautiful but not romantic, and sufficiently hilly to be free from monotony or tameness. The beauty, however, is increased by a number of valleys which open into the plain in different directions, and by the contrast of woodland and meadow, and a thickly settled village with its streets, and country mansions scattered upon the distant slopes. In some directions you have long, vista-like views, and in others, the view is limited by the wood-clad hills, which always rise up in even, unbroken slopes, and which are based by imperfect circular terraces. The soil of the farm is (and in speaking of this farm I am speaking of a class of farms, and not an individual farm,) a gravelly drift, in part with sufficient clay to give consistence, and a sufficient degree of tenacity to prevent leeching; it is, strictly speaking, a grain and grazing farm; that is, it produces excellent barley and maize and is, of course, excellent for grass. Good wheat can now be raised, yet it is not so profitable as other crops and other kinds of husbandry. The farm is divided into lots of moderate size, by excellent stone fences, banked up by earth eighteen or twenty inches on each side, which arrangement increases greatly the durability of the fence. In cultivating grains, Mr. R. informed me that he follows, usually, a three course system; first, Indian corn and roots after grass—second, barley—third, wheat with grass seed. The first and second crops sometimes reversed in their order. When a fourth grain crop is determined upon, Mr. R. says he never sows wheat after corn and roots, as the amount of manure applied to them, will not allow the straw of the succeeding crop of wheat to stand until ripening. He rarely sows oats, and these only on the poorer and more humid portions of the farm.

This is the result evidently of experience, and may, without doubt, have a general application to most farms in this particular range and this particular geological formation. The animal manures of the farm are applied exclusively to hoed crops, and usually ploughed under. Mr. R. is now attempting a series of experiments in order to test the comparative advantage of ploughing under or dragging in on the surface. When dragged in, it is rotted in heaps and the drag follows the cart. The night soil is manufactured into poudrette by placing it, early in the spring, in alternate layers with gypsum, earth, leeched ashes, coal-dust, &c., &c. This is intended to be applied to the turnip crop. In addition to these natural resources, Mr. R. purchases as many bushels of gypsum as there are acres of cleared land, and in addition to which, he has purchased this spring, one-half of the ashes of an extensive ashery. By this course of treatment, it is evident that Mr. R. intends to maintain the fertility of his lands.

Mr. R.'s roots were sown at the time of my visit, May 26. In addition to potatoes, he cultivates the ruta baga, mangel wurzel, and carrots. He received the two premiums on turnips last year; the yield amounted to eight hundred and fifty bushels to the acre, which was the lightest crop for several years. The previous year, his crop was nine hundred and fifty bushels, and drew the first premium of the State society. The roots are stored in a root-house, and fed throughout the winter to the cattle.

I have now spoken somewhat at length of Mr. R.'s farm and its management, I now deem it high time to close,

By expressing my wishes for your prosperity.

E.

III. Randall's Stock.

Cortlandville, May 28, 1845.

My Dear Friend—In my last I was speaking of the management of Mr Randall's farm, his crops, rotation, etc. I now proceed to speak of Mr. Randall's stock, which appears to be well cared for, his cattle being provided with warm stables and his sheep with sheds; and for feeding, all his arrangements are made with an eye both to comfort and economy. Considering his farm as strictly a stock farm, all his straw and coarse fodder is required to be consumed there. His cattle, he informs me, are supplied with turnips and straw, which are sliced and fed at 5½ A. M. through the winter. Two other feeds are dealt out during the day, viz: one of straw and another of hay. The sheep last winter were fed three times a day, besides a gill of oats and oil meal a head, mixed in equal parts. Every animal is required to consume the whole of its fodder, or else it is forthwith shortened. The cattle are all Durhams, or their crosses. The crosses are with the Ayrshire, New Leicester, Holderness, Holstein and Native. I saw about thirty head together. They were all compact and hardy-looking animals, and some of them are animals of great beauty. The stock bull is a superior animal, (admitting that I am a judge,) by Col. Sherwood's "Archer," out of Mr Waddle's "Gazelle." In breeding and raising stock, Mr. R. is governed by the principle, that fashion nor long pedigree alone, shall induce him to raise or keep a delicate animal, or one whose constitution is not vigorous. The cows must be milkers; failing in these respects, any animal is put unhesitatingly to the knife, though its pedigree may be as long as a monarch's.

Of swine Mr. R. raises the pure breed, but believes that the half bred animals are the best for slaughter.

I now pass to Mr. R's sheep. I have not omitted his flocks till now because I considered them of the least importance, I rather consider this topic as more important than those which have preceded it. It is all-important, in the first place, that sheep should be hardy, then, superadded to this, they should carry a heavy, fine fleece; or in other words, those sheep which endure the climate well, and which shear the greatest weight of fine wool, are the best adapted to the interior of New-York. Taking this view, Merinos are, according to Mr. R., the best variety. A person perhaps, might well inquire of me, where are those to be obtained, since the Saxon mania has almost extinguished them? However, that we may be satisfied that there are pure bred flocks which have descended from the importations of Livingston, Humphrey, Jarvis, etc., recent publications seem to assure us; and here I may say in passing, that one of these pure bred flocks is owned by Mr. R. This opinion, which I first formed after seeing them, was afterwards confirmed by the attested pedigree published some time since. There is a question, however, which appears to me of some moment; it is this—have the flocks preserved their original characteristics, or have they degenerated; and if the latter, should new importations be made? As it regards degeneration, I barely remark, that the test must be found in the fineness and weight of wool. It appears from statements submitted to the State Agricultural Society last winter, that Mr. R.'s flock *averaged nearly five and a half pounds of wool.* This was sold for 48 cents per pound. I have compared samples of it with those from the Merinos imported by Seth Adams into Massachusetts, and to the eye, the staple of the former is superior to that of the latter. Mr. R. thinks his wool will average better than that of the originally imported sheep, of which he showed me many samples; and what imported flock ever approximated to the average weight of five and a half pounds of washed wool? As it regards fineness, I propose to test the quality directly by measuring when I return; for I find different persons' eyes and judgments differ very materially. As this flock has become so celebrated by carrying off the first premium of the state society, and the society's gold medal, as the best managed flock, I will give some additional information of his flock, which I have derived directly from the owner. It consists of about one hundred breeding ewes, mostly Paulars, but contains some other varieties of the same breed. After a moment's inspection I could readily distinguish the Paulars by their heavier and more compact carcase, shorter legs, more wrinkled skins and darker crusted wool.

I saw some rams and ewes got by a Rambouillet ram, which was a choice one of the variety; their dams, prime Paular ewes. The half blood Rambouillets, were lighter colored, longer legged, less heavy in the fleece, and altogether bearing no inconsiderable resemblance to a cross between the Paular and Saxon. Many ewes were shown me which though they were only coming two or three years old, sheared last year from 5 to 6½lbs. of washed wool per head! It seems, to be sure, almost incredible, still, when you examine the density of the fleece and its fibres, as it stands on the skin, and then stretch out the ample folds, the whole story is told; it is no longer incredible, for one of those skins seem to be capable of covering a carcase twice as large as the one to which it belongs. On many of these sheep there is not an inch of skin from the nose to the tail, which was free from folds and wrinkles; but especially are these folds ample upon the sides. These corrugations form no obstacle to shearing as might at first be supposed, as they can be drawn smooth enough for the shears to pass over them. I believe it has been erroneously supposed that the Merino owes much of its weight of fleece to its gum. There is, it is true, a considerable crust upon the surface, or the extremity of the wool, which does not readily wash out in cold water; but the oil inside of the wool where there is no concrete gum, washes as readily from the Merino as the Saxon. Indeed, the distinguished manufacturer, *Samuel Lawrence, Esq.*, of Boston, in answer to inquiries addressed to him last year, stated the fact that the shrinkage in scouring, between Merino and Saxon wool both washed in the ordinary manner was only seven per cent. Mr. R. considers the outer crust a decided advantage, as a protection from cold and storms, but objects entirely to any inside concrete gum which he thinks of no use—or only of use to take in the inexperienced purchaser; a course as injurious to the ultimate interests, as to the reputation of the wool grower. I observed that the wool of all his sheep opened free from this gum.

I saw in addition to the above, six reserved rams, some of which are intended to be used as stock rams, and others to carry out some small experiments in crossing. Two were Paulars, the third bred by *Francis Rotch*, the fourth from Consul Jarvis' stock (through the Sandford buck,) and the other two, the half blood Rambouillet stock already alluded to. Some of these were choice animals; but the two Paulars (one of them the prize ram,) were really superb animals. The oldest now coming three, sheared 8 lbs. for his first fleece, about 10 lbs. for second, and Mr. R. is confident his third, or present fleece, will exceed 12 lbs. of washed wool! Nor does the Merino attain his full weight of fleece until four. For carcase, weight and quality of fleece, with all peculiar characteristics of the Merino, I never have seen an animal which excelled him; and the other Paular, a yearling, bids fair to equal the first, or prize ram.

To secure confidence in all Mr. R.'s statements, in regard to weight, Mr. R. adopts a plan worthy of imitation. At shearing, some individual of well known character is invited to bring his own steelyards, and he weighs and makes a minute of each fleece as it is taken from the sheep. It is true, such testimony is not strictly necessary, but it is satisfactory to strangers, and it silences those low cavilers who are ready at least to affect to discredit results which they lack both enterprise and skill to bring about.

Mr. R. has reared about 100 per cent of lambs the present season, which, taking into consideration the number of ewes under proper breeding age, was certainly quite unusual; a fact which speaks well of the skill and mode of management. But one Paular lamb perished. All are indelibly numbered on the day of their birth according to Von Thaer's method, and their pedigree recorded.

So much for the sheep, and as this seems to be a proper place for closing this letter, I now subscribe myself,

Yours, &c. E.

IV. Farm and farming of Mr. Hopkins.

Auburn, May 30, 1845.

My Dear Friend—It was my design when I came to this place, to have called at once on our friend Mr. Sherwood, the former great land Admiral of New-York, for the purpose of seeing his fine stock of cattle and sheep; but I found he was absent on a tour to the west. I must therefore wait for another opportunity.

But now, as cattle and sheep cannot form the subject of my letter, I will speak of Auburn, though I do not expect to give you much information of the place, which is not already in your possession. Auburn is located about centrally between Albany and Buffalo, on the great railroad thoroughfare; it is nine miles east of Cayuga Bridge, at the termination of steamboat navigation of Cayuga lake, and which opens a communieation south, of forty miles, and through an excellent farming country. Its location though inland, is highly advantageous, whether we regard it as a place for business or social intercourse. But what gives Auburn superior advantages for business, is the water power upon the outlet of Owasco lake, which passes directly through the village. The creek issuing from this lake descends rapidly five or six miles; or to be more particular, it falls in fourteen miles—that is, from Auburn to the canal—two hundred feet, and between seventy-five and one hundred between Auburn and the lake. By this descent, it forms a site for mills at every half mile, from its source to the canal. The lake is a body of water twelve miles long; it is a great reservoir, not liable to fluctuations during the year, and it has the advantage of a comparatively high temperature during the winter. In addition to the above, good quarries of limestone have been opened, which furnish excellent stone for building. The necessaries of life, too, must be comparatively cheap; what may be termed the common elegancies of life, are free to all. The country itself, though not romantic, or marked by bold and striking features, is yet sufficiently diversified with hill and dale, cultivated fields, with tasteful farm-houses and noble woodlands, to make it all that can be desired for a country residence. All the fruits of a temperate clime grow here, or may be grown, in perfection. Apple, pear, peach, plumb, are sure to thrive if they but receive common attention, as is proved by their abundance in all ordinary seasons.

In my rambles about the country, I was quite fortunate in being thrown into the company of Mr. Ira Hopkins, a successful and intelligent farmer, who kindly showed me his farm and gardens, and introduced me to his son in Mentz, who also holds the plough and sows his fields and conducts his farming on scientific principles. He has been eminently successful in the cultivation of the *teasel*, and in my next, I will give you an account of his mode of raising and curing it for market.

But to return to my new friend, Mr. Hopkins, senior. He first accompanied me to his farm three miles north of Auburn. On our way, he called my attention to a large field of wheat, which had been very badly managed by the owner. There was certainly very striking evidence of a want of intelligence and practical skill in its management, which I suspect is not uncommon in different degrees. The field in question, when taken in hand, was in its full strength, as appears from the fact that it bore a heavy crop of timothy when first ploughed. It was broken up last spring and sowed to oats; but, contrary to advice, it was ploughed when wet, and so wet, that the water followed the plough in the furrow; the consequence was a return to its original compact state; or rather, a state worse than compact—a hard, lumpy condition. The crop of oats, as had been foretold, was less than one-half the ordinary yield. After the oats were removed, it was again ploughed and sowed to wheat; and now, June 2d, it is a spotted concern—here a bunch of spindling wheat—there a patch of rough naked ground—and certainly the prospect of success is no better than with the oats the preceding year.

Among many other things relating to agriculture, Mr. H. gave an account of a singular experiment which he had tried. It was to see whether winter wheat could be treated as spring wheat, by which a crop could be obtained the first season after sowing. It had been said that it could be, and said with so much confidence, that Mr. H. determined to test the point by trial.

Accordingly, following the precise directions, Mr. H. prepared a bushel or two of wheat by first moistening and then rolling it in plaster and a few ashes, and then wetting the whole so as to secure its germination, when it was put away into his chamber and suffered to freeze. In this state it remained till near the time for sowing spring wheat, when it was again taken in hand and separated, the roots and plumulas being an inch or two in length and forming a dense interwoven mat. It was again rolled in plaster and sowed on land well prepared for wheat. It soon appeared green, or grew well, and looked flourishing, and with a prospect of success for a time; but after a while it ceased to grow, stood stone still, and only here and there did a stem consent to send up a slender, spindling head. It was therefore an unsuccessful experiment. It must, however, be conceded that there was something in the proposal which had a show of reason in it, a possibility, and hence it was well to put it to the direct test.

Fearing I may not interest you, I will close by giving you one or two results of Mr. H.'s success in farming. On one field of about ten acres which I visited, this gentleman raised eighty bushels of corn to the acre, and this without extra labor or extra tillage. The crop was preceded by wheat, on land which is usually termed a clay loam. I do not speak of this as any remarkable yield; I only speak of it as a profitable crop. Again, Mr. H. has raised forty bushels of spring wheat to the acre without going out of his ordinary mode of culture. The facts go to prove what I stated in the commencement of this letter, viz: that Auburn and its vicinity has a rich soil. This is due in a great measure to the gypseous shales which crop out from beneath the Onondaga limestone. These shales are brought up by a slight uplift or fracture which extends several miles to the northeast. This overlying limestone is fissured and probably cavernous, and a large proportion of the surface water sinks into the rock, collects, and forms underground streams, which issue at different points in the form of large springs. The most remarkable of these is at Springport.

Yours, &c., E.

V. Culture of the Teasel.

My Dear Friend—I now propose to fulfil my promise given in my last, to describe to you the culture of the teasel, as conducted by my friend, Mr. Hopkins, to whom reference has been made.

But first I will speak of the teasel itself. Botanically it is an interesting plant. In books its generic name is *Dipsacus*, which signifies *thirst*, in allusion to a quantity of water which collects in the axils of the leaves, which being concave give a lodgment at those places, and what perhaps is not very singular, is, this fluid enjoyed the reputation of being a good cosmetic, though in reality it is nothing but pure water.

There are two species of the teasel, one, called the *sylvestris*, from its inhabiting woody places; the other, *fullonum*, referring to the class of men by whom it is used, viz: the fullers. Now most persons scarcely distinguish them apart; they regard both as one, and this is not very remarkable, as they look very much alike; but an inspection of the hooks of the scales or chaff of the flower heads will set one right; the latter has hooks bent outwards, while in the sylvestris they are straight. It is by the bent and exceedingly fine points of these flower scales or chaff that they are fitted for the office in which they are employed, viz: that of raising a nap upon woolen cloths; and so important are they, that not a piece of broadcloth can be made without them. No machine or process has yet been devised which can perform this work, though many attempts have been made to supply their place. The teasel forms a natural family of plants by themselves. Their leaves are either opposite or stand in circles (whorls) around the stem. Their flowers are situated at the end of the stem, and are collected in an elongated oval head. Some persons probably consider them as a kind of thistle; but their heads are really different, though the family stands next to the great family of plants known in botanical treatises as the *compositæ*—a family in which the thistle tribe is found. The teasel is a biennial plant, or requires two years to come to perfection. It is hardy, belongs to the temperate climate, and bears frost well. It is not difficult for thorough-going farmers to cultivate it. It may be cultivated on almost any kind of soil, provided it is not too rich; the best teasel is, however, raised upon a rather stiff clayey loam. The ground is to be broken up early in the spring; the seed is sown in drills three feet apart, and may be put into the ground any time from the first of April to the first of June. It is better, however, to sow as soon as the field is sufficiently dry, as the young plant is not injured by frost, should it occur, and an opportunity is given for a wider extension of its roots. The seed, when sown early in April, will require first hoeing by the middle of May, or when the leaf is about two inches long. Without entering upon an exact detail of what is to be done, it will be sufficient to state that the plant will require much the same treatment as maize or Indian corn; or that during the whole period it will require to be kept free from weeds. Attention so as to secure the growth of the plant is not so difficult as curing the teasel and putting it in a condition for market. This part of the business I will now speak of.

It may be considered as ready for picking when it has just past flowering; or when the petal (flower leaf) is ready to drop. Here is an important fact to be noticed; the crop must be attended to and gathered at once; for at this stage only are the heads and awns of the floral leaves sufficiently elastic and tough to be adapted to the fuller's use.

If, then, a careless farmer attempts to raise the teasel, he will, ten to one, lose his crop, or let it injure, for want of immediate attention at the precise time at which it is required. But this is not all; the teasel being gathered at the proper time, would still be lost without careful drying; for at this time it is not like the dry head of the wild teasel which we see in the autumn, but it is full of the juices of the plant; and these must be evaporated in a mode which will prevent mould or mildew, and at the same time preserve the elasticity of the hooks. To effect this, Mr. Hopkins has erected a number of buildings in form and size of the common corn-house or corn-crib, only the spaces between the thin scantlings are a little wider, in order to admit of a freer entrance of air. In the interior, temporary scaffoldings are put up about two feet apart, which are also formed of scantlings laid upon supports, with inch spaces between each. Upon these platforms the teasel is laid to dry. Here, being freely exposed to currents of air passing through the building, the moisture speedily evaporates and is carried away; and being at the same time in the shade, the material preserves its elastic property as well as flexible state, upon which its great utility in cloth dressing depends. From these remarks, it will be seen that the requisites for raising and curing good teasel, are first to cut it at the proper time, and second to dissipate the moisture without injury to the head; and farther, that a lazy farmer is not the man to raise teasel. Such is not Mr. Hopkins. His teasel commands the price of the imported article, and in fact is the best sent to market. An acre, well managed, yields upon an average, 75,000 heads. Their price in market varies from eight to twelve shillings per 1,000. Ten shillings is about the medium price. This plant is not supposed by Mr. Hopkins to exhaust the soil, but rather to benefit it, partly by the mechanical action of the roots, which being somewhat of a tap form penetrate deeply, and hence divide it; and thereby it is better prepared for corn and other crops. Without doubt a large proportion of the matter of the plant is strictly derived from the atmosphere through the intervention of the soil; still, like all other vegetable bodies, it has its inorganic constituents, which must be derived from the soil itself, and hence, thus far, the plant must impoverish the soil. So much then, for the teasel, which will probably always bear a fair price and pay for cultivation; yet, comparatively few seem disposed to grow it, either from the care which they are unwilling to bestow in curing it, as well as on account of the time required for the article to grow; as nearly two years must elapse before there is a return for the labor and expense incurred in its cultivation.

My subject being exhausted, I must close.

Yours, &c., E.

Auburn, June 5, 1845.

VI. Gleanings from Greatfield.

Aurora, June 6, 1845.

Dear Friend—I have just returned from a visit to David Thomas. Now if I consulted my feelings only, I should break out into something which you would call his praise. There are, however, some strange customs in society: for instance, you may talk as wickedly of a living man as you please, especially when he is a candidate for an office. You must not, however, speak in his praise, unless you intimate at the same time, or before you close, that after all there are some indications that he may be a hypocrite, or a great scamp. The contrary, however, becomes the rule when a man dies. You must then show your charity by giving at least a thin coat of whitewash, though the individual was a notorious thief. The latter may be very well on some accounts, still, truth is a little too precious to be trifled with, and too valuable a commodity to be sacrificed on any occasion. But let us return to David Thomas, not however to praise, but simply to speak of his pursuits. David Thomas then, is, strictly speaking, a botanist of the first class. Not, however, one of those who has only studied the characters by which plants are named and distinguished, he is not one who has guzzled down and stored in his memory a multitude of strange words; but he is one who has studied the *affinities* of plants and has made this knowledge highly useful in their cultivation. It is for this reason that he is the best *pomologist* in this State. He has made it his great object to settle a few great and important problems in fruit growing. His object is to determine what is the best mode, the easiest and shortest mode of procuring fruits; what kinds are upon the whole the best, and how they may be improved. These are great problems, and a long, industrious life is full short enough for their settlement.

Before I proceed with my gleanings of Greatfield, I will say a few words of the soil of Aurora and of its vicinity. Two kinds mainly predominate. Near the lake, and especially towards Springport, a drab, stiffish clay predominates. It is a pale fawn color, though sometimes a deep annatto red. The other is rather a calcareous loam, not however, as a general rule, with sufficient lime to effervesce with acids. It is a drift mainly, having been derived from the sandstone, shales and limestone immediately north. The first, or drab colored clay, is derived from the gypseous shales below the water lines; the red slate which reposes upon the Niagara limestone furnishes the coloring matter to this important deposit. These shales give the wheat growing character to this region, and this particular soil diminishes as you go up the lake. There is one great advantage in this soil, it will produce wheat as long as the world stands. I will at any rate stake my reputation on this assertion, that this particular soil will endure for this particular culture longer than any other wheat soil in the United States. You need not ask me now of the grounds upon which my opinion is founded; this I will state at some future opportunity. I believe that I have already stated that farmers suppose that wheat is a peculiar favorite of the limestone region; limestone however, is not, in this case, the element, the important element of the soil of the wheat region; or the element which is mainly instrumental in giving this character so much prominence in wheat growing; but the peculiar slates and shale lying between the Onondaga limestone (in this part of the State) and the Niagara limestone. They seem to have the proper elements for this crop. What I have called the calcareous loam, produces, it is true, very good wheat. Nevertheless it is mechanically at fault, it cannot hold the root of the wheat; hence it suffers often from frost or freezing, and is raised out of the ground.

This is the case, for example, as far from the lake as Poplar Ridge, where the soil has a large proportion of foreign drift, and where it is not less than one hundred feet deep. It is here that the influence of the drab clay is mostly lost. Poplar ridge is 670 feet above Cayuga lake, which runs parallel with it. From this ridge the country slopes very uniformly to the lake, though several deep ravines are formed into the Hamilton slate and shales, by the streams which flow across them. Though it is rather a common observation that large bodies of water protect from the frost, still, though common, I will state that this year has furnished a very remarkable instance in confirmation of this common opinion. The frosts of May and June for instance, have done little or no damage on the borders of the lake, while 300 feet above, at the distance of a mile and a half, grapes were cut off.

Setting out trees, transplanting herbaceous plants, whether flowers, fruit, roots, &c.—Every person is interested in transplanting vegetables, and for a matter of so much importance it is rather singular that so little is known of safe and secure methods of performing it. David Thomas pursues the following. Remove the plant with as little disturbance to the roots as possible, then mud them, that is, cover the roots with a thick paste of tenacious mud, and close the operation by sprinkling sand on the outside, or dust them over. This preserves the roots effectually. They neither dry, nor are they so liable to injury, by abrasion, &c. Another method, where large trees are to be transplanted, is the following: In June, cut a narrow trench at a proper distance from the trunk of the tree, sufficiently deep to divide the roots; the distance will depend upon the size of the tree, for the great difficulty in transplanting large trees is their weight; but at any rate, take in this trench as much as can be transported with the tree. Let the tree stand till late in autumn. Then transplant the whole. During summer the mass of earth enclosing the large root will be filled with new fibres and small roots; the tree when thus removed, goes on with its growth with little interruption only.

Grafting.—The wax used by David Thomas is spread thinly upon muslin, like adhesive plasters. These plasters, cut into proper shape, are wound around the stock and at the junction of the graft. In order, however, to secure certainty of success, wind the scion, also, to a point near its extremity. The great benefit of this mode arises from the moisture or sap which is retained by the impervious plaster. This method of grafting is also extremely neat and elegant.

Fruit.—There is a very wide difference in the time required for grafts to bear fruit. The Bergamot bears in from twelve to fifteen years, requiring a pretty large part of a man's life before he can partake of its fruit. Some others will begin to bear in one or two years, producing fruit equally valuable with those which require a greater length of time. Dearborn Seedling, David Thomas considers among the best of our pears, if not the best.

Our friend has succeeded in engrafting the ***Robinia hispida*** upon the common locust; he, however, considers the calcareous soil of Aurora as unfavorable to the growth of the locust. Some trees, he says, have but little choice in the selection of their food; others are very fastidious, and this is a case of the latter.

David Thomas finds that manuring shrubs and trees is of as much consequence as that of grain. A very striking example was given in that of a pear, which for many years had produced execrable fruit, but which, on being hoed and manured well, produced immediately fruit of the highest flavor. Superior flowers also result from similar treatment.

To transplant cabbages and similar plants, David Thomas suffers them to be set in water twelve hours before putting out. They rarely wilt down when thus treated, especially if set near the close of the day.

To prevent plants from heaving by frost, press the earth strongly and closely around the root,—especially let plants be treated in this way, which are set out in autumn.

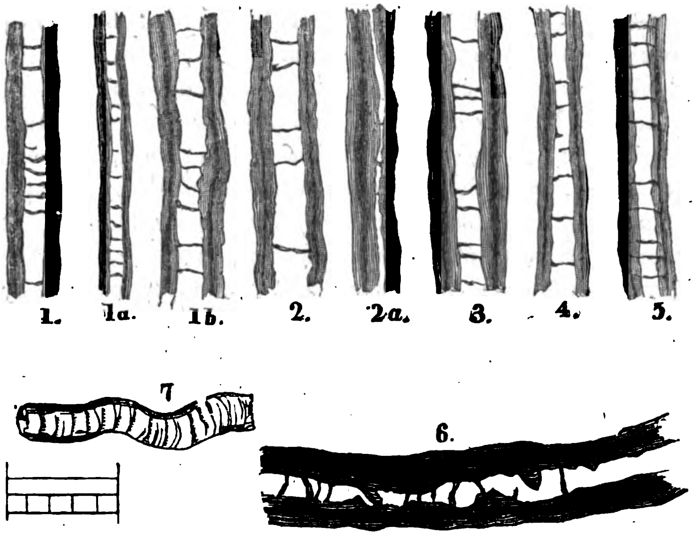
Many other modes of treating particular plants were detailed to me; but as I have already trespassed, probably, on your patience, I will close by stating that an Agricultural Institution is growing up in Aurora, under the immediate supervision of Mr. Young and Dr. Thompson, gentlemen who are every way qualified for this enterprise, and with which David Thomas is connected as counsellor. Aurora is an excellent township, and the farm of the Institute is very pleasantly located, overlooking the Cayuga lake.

I am yours, &c. E.

VII. Wool and its Structure.

My Dear Sir—Having given you a pretty full report of the farm and stock of Mr. Randall, embracing many details also in the several branches of husbandry, I now propose adding a few words as an appendix to that report. I gave some intimation when speaking of the fineness of the wool of Mr. R.'s sheep, that on my return home, I would furnish something more exact as a test for fineness than the naked eye. In fulfilment of this intimation, I have been engaged since I returned, in measuring the diameter of the different staples which I procured while at Cortlandville, and which I have compared with others obtained of our mutual friend, Luther Tucker, Esq., of the Cultivator.

The different kinds are indicated by numbers. I have prepared a scale which is equal to 100 millimeters; a millimeter is equal to 0.039 of an inch. The hundredth of a millimeter, and the fibres of wool, are all subjected to the same magnifying power of an excellent Chevalier's compound microscope. The comparison is both absolute and relative ; but it is highly interesting to see the perceptible difference between the different fibres of wool. The microscope also reveals other differences ; some of the fibres appeared rather uneven, or flattened, and destitute of a clear and distinct pith or tube ; and in fact I may remark, that the microscope is really the best method of testing the real quality of wool. By this instrument I shall be able, at any time to make other experiments which may serve as standards of fineness.



No. 1, Mr. Randall's ; No. 1 *a*, fibre of Mr. Randalls' prize Paular Merino buck ; No. 1 *b*, fibre from one of Mr. Randall's fleeces ; No. 2 and 2 *a*, fibres from Mr. S. Adams' wool ; No. 4, Remilles' wool, Shoreham, Vt. ; No. 5, fibre of S. O. Burchard's fine wool, Shoreham ; No. 3, fibre of Charles L. Smith's wool, Shoreham ; No. 6, fibre from Collins' Grandee. The last five were taken from wool left at the Cultivator office. In all the fibres examined, there is a very great uniformity in the parcels ; only slight differences, in fact, could be detected in the several diameters. No. 7 shows the structure of wool as seen under the microscope. In the corner is the scale of measurement. The finest fibre, as magnified in this cut, is equal to about eighteen hundredths of an inch in diameter.

Another inquiry equally important with the preceding, came up in this place: What is the strength of a single fibre of wool, and is the coarser comparatively stronger than the fine ? I set about answering those inquiries at once, and now give you the result below:

Mr. Randall's No. 1 *b*, on three trials, supported on an average, 62 grains; or, rather, broke when tried with the weight of 62 grains.

Mr. R.'s No. 1 *a*, broke with 57.1 grains.

The fibre from Collins' Grandee, on three trials, supported on an average, 84.6 grains.

Mr. Smith's specimen of Shoreham, Vt., on three trials, gave an average of 67.6 grains.

Fibres of wool present rather a smooth surface and a cylindrical form, or a flattened cylindrical form. There are no serratures, as has been represented, but the fibre is not of an equal diameter throughout; it presents also, projections which seem to be owing to disease. It is probable that the characters of the best wool are roundness and equality of diameter, and freedom from the projections here referred to. The fibre is traversed by transverse septa, or divisions, and probably when the wool is growing vigorously, they are at equal distances. Under the microscope these partitions, or septa, are often interrupted, or project only half way across the hollow part of the fibre. From the experiments which I have made on the strength of the fibre, it appears generally, that the fine wool is proportionably stronger than the coarse—though I found in some experiments, that the strength was in a direct proportion to the size or diameter. Further experiments seem to be required to settle conclusively these interesting and important inquiries.

There seems, however, to be some diversity of opinion as it regards the form and structure of a fibre of wool. I have examined the fibre often under a microscope, but still I have not yet seen that sharp, serrated structure, which good felting wool is represented to have. There is no greater difficulty in observations upon the fibre of wool and hair, than any other small object. To give you my opinion of the structure and mode of growth, I have only to say, that, like all other organized tissues, it is composed of cells; but in wool, hair, &c., the cells are arranged in a single row, like a string of beads. The newest cell of the root or bulb pushes out the hair—or in other words, it grows at the base. These cells have a slight conical shape—the lowest one jutting over or inclosing the base of the one next above. This gives in some cases a ringed appearance. The rings, too, in many cases, as those of a hair, for instance, resemble those on the horn of a sheep. These rings are farther apart or sharper, or are better defined in fine furred animals, such as the otter and beaver, than in the wool of sheep.

In concluding this letter, let me suggest a practical and not difficult method of registering wool: Let a wool-grower determine with the microscope (using always a given power,) the diameter, structure and form, of the fibre of the wool, from the standard parts of the fleece. This would require not more than three or four specimens. These are to be drawn on a card of a convenient size, in the mode I have represented in the wood cut. To this, let small locks or specimens of the wool from those parts be permanently attached; let as many samples as the breeder or wool-grower wishes, be treated in this way; or fill up the card. It is easy to see that when this is done, it gives a permanent or durable record of the fineness and other qualities of the wool of every sheep whose fleece is thus registered. All the changes which may take place in the offspring, or in subsequent breeding, may be immediately determined by the microscope. What would still add to the value of such a mode of representation, the card or plate can be put on copper, and multiplied indefinitely. Friends, manufacturers, wool-growers, &c., might in this way be supplied with the best kind of registers of the flocks in this country. The person, to be sure, would have to attach a small lock of the wool to each sample of the measured fibre; but this might be done in a few moments. The great utility of this method, is the certainty of the results. We may, to be sure, judge of fineness by the eye, and determine with a low degree of satisfaction, other properties also. But men after all, will differ; your eye will not probably fit into the socket of my own; and then when you can guage a thing as a cask of liquor, what's the use of guessing? Let us then have the wool guaged and registered, and not go through the world guessing and guessing, and after all, never fully satisfied.

I am, yours, &c.,

E.

Albany, June 25, 1845.

PRACTICAL DIRECTIONS FOR THE FLOWER GARDEN.

PART II.

BY M. SUTTER.

V.—MANAGEMENT OF PLANTS IN THE FLOWER GARDEN.

HAVING spoken in general terms of the care and proper attention of the flower garden, it may be serviceable to attend more particularly to some particular kinds of plants which are generally cultivated. These may be divided into *annuals*, or those which grow from seed, flower and ripen their seed and die in one year; *biennials*, those which flower and die in the second year after being sown, and *perennials*, which live for a number of years and flower every season.

Annual flower seeds should be sown in the open borders as soon as the weather has become settled and warm in the spring, and not before. As they will generally flower in about two months from the time they are sown, there is no need of hurry to get them into the ground early. Disappointment will generally attend such haste. Those kinds, however, which will bear transplanting, may be sown in pots in the house, or in a hot-bed, whence they can be removed to the open ground in proper season. Those which will not bear it, should not be sown till they can be safely trusted in the spot where they are intended to grow. Some, like the cypress vine, will not germinate until the earth has become very warm, and such should be soaked in warm water, before sowing them, a few hours. But artificial watering should not be resorted to after planting, except in case of severe drought.

After they have come up, when they have attained the height of an inch or two, they should be carefully thinned out so as not to stand too thick and crowded, the earth stirred and loosened about the roots, and kept perfectly free from weeds Their growth or beauty will be increased by an occasional watering with liquid manure. In want of showers, free use of rain water from the watering-pot should be made every evening. The ground should be frequently stirred with the hoe and every means used to promote a rapid and healthy growth.

There are some annuals of great beauty, the seed of which does not come to perfection, or whose seed, if sown, will not produce the same kind. Such are the verbena, petunia, pansies, &c. These must be propagated from cuttings, taken in the fall and kept in the house through the winter. Those mentioned, as also the annual phlox (drummondii,) dwarf larkspur, and many others should occupy a bed by themselves. As they trail along the ground they will in a few weeks entirely cover the bed with their rich and varied colors. Others may be sown in drills, circles or patches, according to the taste of the cultivator.

Vines should be provided with proper frames to climb upon. These may, with a little taste, according to the kind of plant, be made to present a beautiful appearance, giving them the form of a fan, bell, pyramid, cone, lyre, &c.

Some hardy kinds of annuals may be sown in September, which will bring them so forward as to flower very early in the following spring.

The treatment of biennials is in general the same as that of annuals. They should be planted in a bed by themselves the first year, and in the autumn or spring of the following removed to their place for flowering. Many of these can best be propagated by layers or cuttings, taken off in the summer. A great deal of trouble often attends the cultivation of annuals and biennials, but many of them will amply repay all the care bestowed upon them.

Perennials are plants which live from year to year. Some will flower the first year they are sown, while others require from one to several years to reach perfection. No particular directions need be given for their cultivation. But some of them, which require peculiar treatment will be considered individually.

In planting the flower garden, those plants which grow to the least height should be placed in advance so as not to be excluded from view by the taller kinds. Considerable taste may be exercised also in the arrangement of colors to produce the greatest effect by contrast.

VI.—OF BULBOUS ROOTS, TUBERS, &C.

These form a very valuable part of a well provided flower garden, and as they require, in some respects, a peculiar treatment, a section is devoted to them. Many of them require to be taken up every year, and kept out of the ground for a few weeks, and then replanted. They all require a light, rich and deep soil to flower in perfection. Some need not be taken up oftener than once in three years. They should then be separated and planted again after the soil has been well manured. None should be removed for any purpose whilst the leaves are green. As a general rule, they may be taken up when their leaves begin to decay, and kept out of the ground from one to four months, and then replanted after the offsets have been removed. The flowers should be pinched off as soon as they begin to decay, as the root loses its strength by going to seed.

When bulbs have been a long time out of the earth, and their vital energy is weakened, they should be planted in a perfectly dry soil, and not have a particle of water till they begin to grow. Then it may be given in very small quantities till the leaves are two or three inches long, and appear of a good healthy color, when they may be watered freely. In this way they will be revived in a year or two.

As a general thing, bulbous roots appear the best when planted in a bed by themselves. When scattered about the borders they show to very poor advantage. The earth should be dug a full spade deep, well pulverised and made very rich with rotten manure. The beds should have a southern exposure, and the centre of the bed, or the north side, should be raised a few inches the highest. At the setting in of winter they should be covered with a layer of straw, litter or leaves two or three inches deep.

Bulbous roots are propagated almost entirely by offsets. In some they increase very rapidly, whilst others send out but one or two a year.

AMARYLLIS.

There are numerous varieties of this bulb, some of which, as A. formosissima or Jacobean Lily, produce flowers of exceeding beauty. Most of them may be cultivated in pots, although many do well in the open ground. When grown in the former way they should not be planted till the flower-bud shows itself, and then should receive but little watering till they have become well started. They should not be covered more than half with earth; and whilst in flower should be watered freely, but less afterwards. Soil—fresh loam largely mixed with leaf mould or peat and sand—one-half loam, one-third sand and the rest leaf mould or peat. If they are planted in beds, it should be done about the last of April or first of May, in rows one foot apart, placing the bulbs six inches apart, and not quite covering them with earth. In October take them up, and keep them in a dry room through the winter. Propagated—by offsets, which are not to be removed from the main bulb till just before planting. These will flower the second year.

CROCUS.

These should be taken up as soon as the foliage is decayed, and in October planted in fresh soil—loamy sand—foliage not to be removed till decayed. These may be grown in pots in the winter in the house, and the flowers, which close every evening, will open in a strong lamp-light at night—propagated by offsets.

DAHLIA.

As soon as the sprouts begin to start in the spring the roots should be carefully divided with a sharp knife, leaving one or two good buds attached to each root; set them in pots in light, rich earth, in a warm room, and water them well. About the middle of May or the first of June they may be transferred with the ball of earth entire to the open ground. If they are not turned out till June they will display their flowers after the hot season is over.

The soil for dahlias should be very rich and deep. A hole should be dug a foot or eighteen inches deep, and filled with fresh earth mixed with one-third good manure.

When the plants are turned out, good stout stakes of sufficient height should be placed in the ground by the side of them, to which they should be tied as they grow, to prevent their being broken down by the wind.

When the tops are first injured by the frost, they should be cut down within six inches of the ground, and the roots covered with a thin layer of straw or litter, and left to ripen. In a week they may be taken up, shaken clean from earth, and packed in dry sand and in a warm room for winter. By not suffering them to ripen well in the ground before taking them up, many people lose their dahlias in the winter.

DAFFODIL, JONQUIL, NARCISSUS.

Select such bulbs as are rounded towards the base, with full round tops—not mouldy nor with decayed fibres at the bottom.

Plant six inches deep and eight inches apart, in August or September. They should not be taken up oftener than once in three years. Some of them are very pretty grown in pots during the winter. These should be planted in October. Soil, light fresh loam, mixed with very rotten cow dung, and dug deep. Propagated by offsets.

GLADIOLUS OR SWORD LILY.

Plant them in pots in March or April, and turn them out as soon as the weather is warm. Give very little water till they start, after which they should have an abundant supply. Take them up in the fall, and keep in a warm room. Soil should be very rich and well worked. Propagated—by offsets, which are very abundant in some species. These are to be taken off and planted separately. By seed, sown in peat and sand in the spring, and well watered before and after they come up. In October the young bulbs should be taken up and dried, to be planted in the spring. They will flower the second or third year.

HYACINTH.

These bulbs should be planted in a dry, airy part of the garden, the earth to be dug to the depth of a spade or more, and mixed with one-third its quantity of sand, one-fourth of rotten cow dung and peat. These are to be well mixed together, and the bed made with a slope of several inches towards the south. Plant the last of October, four inches deep, and put a little sand in the hole on top of the bulb. Cover in the winter with straw or leaves. Lift them about five weeks after done flowering, or when the stem is half decayed. Dry slowly and by laying root to root and covering with a slight layer of earth. Keep till ready to plant in close drawers or dry sand. Propagated from offsets.

To flower them in glasses, put them in, in October, the water about half covering them. Keep in a cool dark room till started, when they should have the warmest room in the house and all the light possible. Change the water at least once a week.

TIGER FLOWER.

Plant in pots in March, or in the open ground in May. Lift them in November and cut off the stalks, dry them and keep in dry sand till time to plant. They must be kept carefully from frost in the winter and also from too much warmth. Soil must be light, rich, free, sandy and dug deep. Propagate from offsets, to be separated a few days before planting.

TUBEROSE.

Same treatment as Gladiolus.

TULIP.

The bed for tulips should be made in an open, airy place, three and a half or four feet wide. The bulbs to be planted in the end of October seven inches apart, four inches deep, and half an inch of sand on each bulb. When in flower, tie up the stems to neat rods. They should not be allowed to go to seed, as it weakens the bulb. When the foliage begins to become of a yellowish brown color, and the top dies, is the precise time to take them up. Lift them carefully, and place in a dry, airy situation till August or September, when the brown skins, except the last one, and the fibres and offsets are to be taken off, leaving the last brown skin till time to plant, when that, also, is to be removed, leaving the bulb perfectly white.

Choose such bulbs as have not lost the brown skin, nor are mouldy nor soft at the root end; full, solid, and rather pointed at the other. Soil, three-quarters good loam, one-quarter leaf-mould or peat, one-sixth two year old horse dung, one-eighth sea sand, well mixed and made two feet deep. They will do very well in a very rich common soil, well pulverized and deep. Propagated from offsets.

VII.—CARNATION, ROSE, &C.

The following plants are noticed here, in order to excite, if possible, a more general attention to them. The almost endless varieties of each, which have been produced within a few years, would form a beautiful garden of themselves. But a proper selection made from them, and placed in every garden, will add greatly to its beauty and variety.

ROSE.

Of the summer rose there are many varieties, embracing almost all colors. They may either be disposed at proper intervals throughout the beds and borders, interspersed with other plants, or they may be planted as shrubbery, scattered throughout the lawn or grass plat. Many of the taller kinds will appear better in the latter way; whilst those which are more dwarfish in their growth, will show better in the borders. The varieties of trailing roses, make an elegant appearance on trellice work, or trained in front of cottage porches. These grow very rapidly, and require proper pruning, as do all summer roses.

The moss-rose in its different varieties may be successfully budded upon other stocks, but is inclined to run out in a few years and fail, unless great care is taken to destroy all the shoots that come up from the root, and which consume the nourishment of the bud. It does better, propagated from layers. Yet those budded upon other stocks, stand the winter better. The wild sweet-brier makes about the best of native stock for budding roses upon. It is itself a good addition to the shrubbery, giving out as it does, particularly after a shower, its powerful but delightful perfume. It sends up from its roots long and stout shoots, which may be budded high with hardy monthlies, and make beautiful standards.

A great many of the monthly roses, are hardy or half hardy, and will stand the winter perfectly well, with a slight covering of straw. These kinds of plants are not so much injured by severe cold, as by sudden thawing, when the sun shines upon them in the winter; and if they are protected from the direct rays of the sun, they will survive the winter very well. Those which grow tall and erect, may be bound up with straw, and the shorter ones may be laid upon the ground and covered there. The covering ought to be removed as soon as the spring opens.

Monthly roses, for the most part, produce their flowers from the new growth of wood, and those shoots which spring up nearest the ground, are always the strongest. It is advisable to cut the old ones down in the spring, in order to encourage the production of these shoots. Soil for roses should be made rich with manure, as they are what are called gross feeders. For those grown in pots, good fresh loam, with leaf mould and manure and a little sand.

Propagation. Summer roses are usually propagated by layers, or dividing the root. Layers should be put down in the summer, when the young wood has become partially ripe, and the next year they will be ready to remove. They may be raised from cuttings from young wood. Dig a hole of proper dimensions, one foot and a half deep, and fill it with fresh stable manure; over this, place five or six inches of good sandy soil. In a few days it will be ready to receive the cuttings. If it is desired to raise trees, the lower two buds ought to be cut out. The cuttings may be four or five inches long.

Monthly roses may be grown from layers or cuttings planted according to directions given under the head of propagation of plants. Put them out in July and August, and remove as soon as rooted.

CARNATION : PINKS.

No family of flowering plants is more deserving of cultivation, than that of the pink. The splendid varieties of the Carnation and Picotee, rich in color, and of most delightful perfume, should be found in every garden. They are very easy of cultivation, the great care necessary for them, being in their propagation, as they run out in two or three years, if not renewed. Choice kinds should be grown in pots, well drained. The plants, whether grown in pots or in the open borders, should be tied up to neat rods, each joint being tied as it grows. Soil, for those grown in pots, equal parts of rotten manure, one year old, and fresh, sound loamy earth, and one-sixth coarse sea sand. These are to be mixed in the fall; frequently turned through the winter, and in the spring it will be fit for use. The soil for those in the open ground, should be made very rich, if possible about the same as the above; and they will make a better appearance if they occupy a bed by themselves, than if set out singly among the flowers.

Propagated by layers. Stir the earth around them, and have a quantity of fresh earth to put over them. Keep them regularly moist and shaded, and they will take root in three or four weeks, when they should be cut off with half an inch of old wood, and after a few days removed to their place, or they may be left till spring before removed. The best time for layering the Carnation, is whilst in full flower or very soon after. They may also be propagated by cuttings; but this requires more care; and is not so certain of succeeding. The Paisley pink can be easily propogated in this way.

By seed. The seeds should be selected from the choicest kinds of half double varieties, sow it in the spring in drills, and when the plants have attained the height of two inches, transplant them into beds for flowering the next summer. Very few need be expected to be double varieties; but those which are good may be selected, and the rest thrown away. The seed from half double ones is said to produce the best flowers. Endless varieties are produced from seed.

PANSY OR VIOLET.

Little attention is paid to this plant in this country, although in Britain it is thought of sufficient importance to have shows appropriated and premiums offered for it. Immense numbers are produced, of great size and beauty. Soil should be rich, and they should not be too much exposed to the sun. Propagated from seed, and by dividing the root; this should be done in the fall, so early that the plants may become rooted, to flower in the spring. If the seed be sown in the spring as early as the weather will permit, some of the plants will flower in the fall.

There are a few annual flowers which deserve particular attention, on account of their varieties and their flowering through the whole summer. These should have each a bed appropriated to them; and as they all trail upon the ground, they will in the course of the summer, cover it entirely with a mass of flowers.

VERBENA.

Of this there are a number of varieties, worthy of cultivation, and every year is producing new ones. The different colors may be planted in a bed by themselves, or mingled in the same bed. They may be planted about two feet, or less, asunder, and suffered to creep upon the ground. Soil should be rich and well worked. Propagated by cuttings which will root well in good soil or charcoal, or by runners which take root at every joint. These must be taken up in the fall, potted, and kept in the house during the winter, to be planted in the spring. Some kinds do not root at the joints of runners, and must be raised from cuttings planted in the summer.

PETUNIA.

This may be raised from seed, but rarely can any good varieties be produced. A few of the best colors can be produced by layers or cuttings which root freely in any good soil. They also trail along the ground, and cover it with their various colored flowers. It may be planted just as was directed for verbena; and the cuttings, after being rooted, must be kept in the house during winter.

PHLOX DRUMMONDII.

This showy annual is raised from seed. Although all its flowers are beautiful, yet it has this peculiarity—that no two roots produce flowers alike. They vary in shade of color, or in the form and size and color of the star in the centre, so that a large bed of it produces an almost endless variety. The seed should be sown in rich, light soil, in pots, in March. It will then have attained sufficient size to transplant singly in an open bed by the time it is warm enough. They should be set out about four inches apart each way. The seed should be carefully gathered as it ripens, as the little pods which contain it open with a spring, which scatters it. As soon as these pods turn to a yellowish color they must be picked and laid by to dry.

VIII.—OF PLANTS KEPT IN ROOMS.

Plants kept in close rooms require much care in order to keep them in even a tolerable condition. But it is gratifying to observe that scarcely a parlor can be found without these delightful ornaments; and the humblest cottager is gladdened by her neat pot of roses, or her beautiful geraniums. Many are always in good condition and thriving, yet some seem to be looking forward as anxiously as a consumptive patient for the opening of spring, when they may turn out and breathe the fresh air and look the sun full in the face.

Plants are very apt to be killed by kindness, in the house during the winter. They are of course kept in rooms but partially lighted, their roots are often drenched with water, their leaves suffered to collect a covering of floating dust, the temperature of the room is kept up to seventy or eighty degrees in the day time and at night suffered to fall down almost to the freezing point,—a change sufficient to throw a man into a fit of rheumatism, and in the midst of all this their guardians wonder that they do not thrive. Under such treatment it should not be expected.

The temperature of the room should never be suffered to fall below forty degrees, but should be kept uniformly below sixty degrees; and all sudden changes in it should be avoided. If the steady coal fire be kept in one room and the plants in another, connected with it by folding doors, the temperature will generally be kept high enough. Great care should be taken at night that they do not get chilled or frozen. A moderately damp atmosphere is better than a dry one.

They should have as much light as possible; if not, the leaves will grow slender and pale, and the whole plant will acquire an unhealthy appearance. A room with a south or southeastern exposure is the best, and they should be kept near the window.

Every day that the weather will permit, the window should be opened a little to admit the fresh air. This is very necessary for the health and vigor of the plants.

They should be regularly watered. This does not by any means consist in drenching them with water; but whenever the earth in the pot is becoming dry, and not before, water should be applied in sufficient quantity to wet the whole mass. Succulent plants and bulbs do not require much water unless whilst flowering; once a week will be found often enough. Plants should be watered in the morning. Liquid manure may be advantageously applied to such as continue growing through the winter.

The foliage should be kept free from dust. Occasionally the earth on the surface of the pots should be stirred to a little depth, to promote the circulation of air about the roots. If the plant is unhealthy, wash it clean, both leaves and stalk—remove half an inch of earth and supply its place with pulverized charcoal, through which it is to be watered. All decayed leaves should be removed.

All woody plants require more or less pruning. This should be done directly after they are done flowering, or early in the spring. Either in the spring or fall, the roots should be examined, and if they are decayed or matted, they should be removed, and the plant repotted in one of a larger size—unless it is desirable to keep the plant small—and fresh earth added. A portion should be removed from the surface of all the pots, and a top-dressing of new soil given. It will be very servicable to frequently stir the earth in the pots during the winter, loosening it with a sharp pointed stick, as deep as possible without injuring the roots. This should be done when the earth is dry, just before watering it. In the spring, as the weather becomes warm, the plants should gradually be accustomed to the air, by giving it free admission ; and about the middle of May or the first of June, they may be carried out. They should not be placed in full glare of the sun, as shining full on the pots, its heat will be apt to destroy them, but in the shade of a hedge or wall, where the sun will fall on them morning and evening. The pots should never be exposed to the sun ; it is a good plan to plunge them in the earth up to the brim, which serves to keep up a uniform moisture ; or a level bed may be made in a shady situation, upon which may be poured a covering of lime left after whitewashing, and on this, a layer two or three inches deep, of coal ashes well packed down, and on this set the pots. During the summer, they should be watered every evening, and in very warm, dry weather, in the morning. When not in flower, they may be frequently showered from the rose of a watering-pot ; but when in bloom, it injures the petals of the flowers.

On the approach of cold nights in the fall, the pots should be washed off clean, and where they have not been before changed, a top-dressing of fresh soil should be added, and then brought into the house. But they should not be exposed to any artificial heat till the air of the house is reduced to 40°. Through the day they should have free air, taking care to exclude it early in the afternoon, if there is danger of a cool night. The great difficulty in keeping plants in good order in a room, is, that they are apt to have too little light, and very often too much water, and are exposed to ruinous changes of temperature.

Pots should be well drained by placing a few broken pieces of earthen over the hole in the bottom. This is necessary not only to carry off surplus wet, but also prevent the roots from growing through. The pans in which pots are set should never have water standing in them, except in the case of those plants whose natural habits require abundance. But if water runs through, it must be poured out. Where plants have been frozen, they should not be thawed in a warm air, nor the sun suffered to shine upon them. They should be showered with cold water till all the frost is out of the leaves, and then kept in a shady and cool place till they have recovered.

In removing plants from the open ground to pots, for the winter, great care is necessary not to break the fibres of the roots. They should be taken up with as much earth as possible, the roots spread out equally on all sides, as the earth is put in; shake the pot, to settle the earth firmly around them. Give them a good watering, soaking the earth effectually. The same care is necessary in removing cuttings and layers into their respective pots.

There is no trouble in removing plants from one pot to another. They can be taken out with the ball of earth entire and placed in the centre of the new pot, fresh earth shaken in around them, and gently pressed down. If the ball does not turn out readily, invert the pot and strike on the top of it with something solid, or push it gently with a stick, through the bottom, at the same time holding the hand firmly on the earth in it, to prevent its falling.

Plants are apt to be infested with insects—the most common of which, is the aphis—usually called the green fly. Enclose the plant in some tight vessel, and fill it with tobacco-smoke for one or two minutes. This will kill them; or they may be destroyed by hand. The red spider can be killed by fumigating with sulphur.

When flowers have withered after being cut off from the plant, they may be revived by cutting off their stems and immersing them for a few minutes in hot or boiling water. When it is desirable to preserve flowers or buds, after being cut, for several days, they should have their stems immersed in water and placed in a perfectly dark place till wanted.

ANIMALS USEFUL TO THE FARMER.

Under this head we are not about to write a dissertation on the horse, the ox, the sheep, nor the alpaca. This, we fear, would be labor lost. But we mean to call the attention of the farmer to some other creatures, which are not only sadly neglected by him, but actually destroyed wantonly, and whose life, we should perhaps be fully warranted in saying, would have saved to him more than the value of many sheep. They are none other than the little birds. If it were only for the beauty they add to this world, we should think that alone would restrain the wanton hand that destroys them. But few are aware of their actual use.

Different families of birds are adapted to various purposes; but those that inhabit our woods and frequent our farms and dwell in the neighborhood of man, are mostly those that live upon insects and worms. And there can be little doubt but the increasing ravages committed every year by injurious insects may be attributed to the destruction of those birds which eat them. The family of "woodpeckers" are provided with a bill fitted to extract the grubs from trees. They walk up and down the body of the tree, prying into every crack in the bark, picking up every little worm they see, and probing each hole the grub has made, to find their prey. But they have nearly disappeared before the guns of the rascally, idle boys. And to this cause we may probably lay the growing destruction of forest and fruit trees by the boring insects. These birds were very abundant in our boyish days, but we see no more of them now, from the big "red-head" in the forest and orchard, down to the little "chickadee" in the dooryard.

The common caterpillar that lives on the apple and cherry tree, is increasing in numbers every year, and doing an immensity of injury; and the farmer or the fruit grower is called upon to destroy them with his own hands. The birds—their natural enemy—have disappeared. We have seen, this spring, thousands of trees entirely stripped of their leaves by these insects, and on the land attached to one country seat in the county of Westchester, we saw a row of nearly a hundred wild cherry trees covered with their nests, and not a leaf. The common robin has been often seen to sit by these nests and eat the caterpillars from them; and we are informed by a gentleman that a pair of wrens that had built a nest in a knot-hole in the side of his house, were seen for one whole day carrying these insects from a web in a neighboring tree, to their young. We have seen the bluebird do the same with the black caterpillar that feeds on the elm. But these harmless and useful birds have not escaped the young sportsman, and the orchards must suffer the consequences.

The "Maybeetle" that feeds upon the leaves of the cherry tree, does great damage to the fruit grower.

The following curious calculation will show the value of even one pair of these insect-eating birds to the farmer. It is taken from "Anderson's Recreations:"

"A cautious observer, having found a nest of five young jays, observed, that each of these birds, while yet very young, consumed at least fifteen of these full-sized grubs in one day, and of course would require many more of a smaller size. Say that, on an average of sizes, they consumed twenty apiece, these for the five, make one hundred. Each of the parents consumes say fifty; so that the pair and family devour two hundred every day. This, in three months, amounts to twenty thousand in one season. But as the grub continues in that state four seasons, this single pair, with their family alone, without reckoning their descendants after the first year, would destroy eighty thousand grubs. Let us suppose that the half, namely, forty thousand, are females, and it is known that they usually lay two hundred eggs each, it will appear that no less than eight millions have been destroyed, or prevented from being hatched, by the labors of a single family of jays. It is by reasoning in this way, that we learn to know of what importance it is to attend to the economy of nature, and to be cautious how we derange it by our short-sighted and futile operations."

We say, then, spare the little birds. They may be of use in saving thousands of dollars to the farmer, and we hope no one will allow the boys to murder them for sport.

We wish, for the same reasons as above, to recommend the *toads* to mercy. They are generally regarded as a loathsome thing, and often killed. But we can assure our readers that they are very useful in a garden for destroying insects. Peach trees are often infested with *ants*, which feed upon the fruit just as it begins to ripen, eating a little hole into the peaches, which causes them to rot before they are ripe. Now we can recommend the toad as an effectual remedy against them. Make a box around the foot of the tree and place one of these animals in it, and he will keep it entirely clear. He may also keep off, in some measure, the regular peach insect. For the latter purpose, however, we would rather encourge the small species of woodpecker to live near us.

Some of these small birds, by proper care, can be rendered quite tame and domestic. The wren and the bluebird can be easily collected around a garden by simply putting up little boxes on poles for them to build in; and the little wren will destroy the worms and millers, and sing you many a merry note into the bargain.

IMPROVEMENT IN AGRICULTURE.

The great improvements made in agriculture in Britain are often spoken of, and it may be interesting to some to know what they are. We therefore propose, occasionally, to lay before our readers some of the most prominent ones, and leading to the most manifest results.

To the slow and cautious farmers of this country, many of them will appear strange—and we will not find fault with such men, if they pronounce them incredible. But they are nevertheless, recorded facts.

The first is a letter in the Farmer's Magazine, London, from a gentleman who had purchased a farm of 130 acres, in Essex, for £3,250, and he states he has already expended £5,200 in permanent improvements—about $26,000. The result is not given, as the improvements have but just been completed, and among them between 80 and 90 miles of drains, being four yards apart and 32 inches deep.

In 1799, Arthur Young said in his report on the improved state of the farms in Lincolnshire, which had been produced by ten year's labor in embanking and draining, and which occupy between 20 and 30 square miles of country—"Its produce before was small—letting for not more than 1s. 6d. per acre, but now from 11 to 17 shillings an acre." Another fen was made, by draining, worth £20 an acre, which had before been only worth £3—and the rent raised from 7 to 20 shillings; and he adds, "there cannot have been less than 150,000 acres drained, and improved on an average, from 5 to 25 shillings an acre."

We continue our quotations from the same author. In speaking of drainage in other parts of Lincolnshire, he says of land which before was good for nothing, that, "though the expense had been estimated at £400,000—its value was rated at £2,000,000, leaving a profit of 1,600,000 to the proprietors.

The same writer mentions another tract of land of 17,000 acres, which "before draining was worth but from 1s. to 3s. 6d. per acre—now it is from 10 to 30s." We might go on quoting from this writer, instances of the same nature to almost any extent. But these only show that the soil is improved, from the fact that the higher rent could not be had unless the land had increased in productiveness. But the benefit is not all on the side of the proprietor. The tenant is glad to pay the increased rent, and finds his interest in it, as the following will show :

"The parish of Limber, 4,000 acres, was formerly let to four tenants, at 2s. 6d. per acre, and all four became bankrupts. It has been enclosed—is well farmed, and at the present rent the tenants are doing well. In some instances, considerable fortunes have been made."

In many cases the tenants join with the proprietors in the cost of improvements, and in some cases even make them alone. One instance is cited where the annual bill of the tenant for bones was from £1,500 to £1,800. "He died a few years since, and left a fortune."

Mr. Pusey, in his report on the agriculture of Lincolnshire, before the Royal Agricultural Society of England, records the following remarkable fact. The gentleman with whom he was journeying, pointed out to him a pillar 70 feet high by the road-side.

"It was," says Mr. Pusey, "a land lighthouse, built no longer since than the middle of the last century, as a nightly guide over the dreary waste which still retains the name of Lincoln Heath, but is now converted into a pattern of farming. This Dunston pillar, lighted no longer time back for so singular a purpose, did appear to me a striking witness of the spirit and industry which in our days has raised the thriving homesteads around it, and spread a mantle of teeming vegetation to its very base; and it was certainly surprising to discover at once the finest farming I had ever seen, and the only land lighthouse that was ever raised. Now that the pillar has ceased to cheer the wayfarer, it may serve not only as a monument of past exertions, but as a beacon to encourage other land owners in converting their dreary moors into similar scenes of thriving industry. Within living memory it was by no means useless: for Lincoln Heath was not only without culture, but without even a road. When the late Lady Robert Manners wished to visit Lincoln, from her residence at Bliholm, a groom was sent forward previously, who examined some tracks and returned to report that one was found practicable. Another family was lost in this heath twice in one night, in returning from a ball at Lincoln, and was obliged to remain upon the waste till morning."

Since 1823 one portion of this heath (no longer) has been occupied by one tenant, who has realized a large fortune; and if such are the results under a heavy rent, what may we not expect from improved agriculture in this country where the owners till the soil and have no outgo in the shape of $5 to $7 for each acre for rent? And what would our farmers think of farming, when, besides the rent, a capital of $20,000 is required to carry on the operations? But such is the case in some parts of England.

We shall close this article by quoting from an article in the London Quarterly Review, a passage on the subject of irrigation:

"Sir Thomas Ackland's farm of Clotsham, which hangs almost precipitously over the valley of Holnicote, at 1100 feet above the level of the sea, affords a good instance.

The name of Catch Meadow indicates the process by which this irrigation is effected. The ground is not reshaped by the costly process required for the irrigation of meadows that are naturally level, but 'shallow gutters are carried around the slopes of the shelving field, tier above tier; and no separate channel is required for carrying the water off, because after flowing over one carrier it is caught in the next below, from which circumstance the name is derived.' The ease with which these catch meadows are formed is remarkable. A field at Winsford, so steep that one could not climb it without the aid of hands, having been limed and planted with potatoes for two years, and overlaid with water-gutters along the slope, has been converted at a trifling cost, from waste, rough ground, worth 5s. an acre, to a field bearing perpetual grass, worth at least 40s. an acre; and Mr. Blake, of Upton has brought less than 400 acres, which had not been let for £1 an acre, to produce £1200 a year, chiefly by catch meadows, which he formed out of moor land, and lets as summering ground to the lowland farmers.

NEW PUBLICATIONS.

Wood's Class-Book of Botany.—Part 1. The Elements of Botanical Science; Part 2. The Natural Orders.

This Botany is designed to give the genera and species of the plants of New-England and of New-York, arranged in the orders of the Natural System, as illustrated by the most distinguished Botanists in Europe and America, and ending with the Ferns. As the author is a correct and intelligent teacher of Botany, and understands the science in its present improved state, he is admirably fitted to adapt the work to the great object of instruction in this branch of Natural Science. Such a work has long been a desideratum in our country. Except among a few connoiseurs in Botany, no progress has been made in the teaching in our seminaries, as all those who saw the meagre results of the artificial system of Linnæus, have felt little interest in continuing their efforts. True, Linneus accomplished a vast amount of good in this study; but he adopted the artificial system only for the reason that no better method could then be formed, and led the way, so far as his knowledge enabled him, in laying the foundation of that Natural System which has been immeasurably improved, and indeed been carried to all that degree of excellence which the advanced state of botanical knowledge admits. All this is unfolded with great clearness and excellence in this work. The language of the Natural System, as it has been so admirably presented in Gray's Botanical Text Book, forms the first part of this Botany; and the natural orders, so far as illustrated in the great work of Torrey and Gray, with their names, constitute the second part. The analytical tables, which come under the descriptions of the several orders, lead on with great ease to the genera, while the tables of the Linnean classes and orders conduct the student, by the most easy steps, to the natural orders, or the genera, where the plant under analysis may be found. All the use which Linnæus designed is thus made of his artificial system. The student will be both delighted and surprised to find the path so direct and easy to the object sought. All the difficulties, which arise from the nature of the objects, will not indeed be made to disappear, but they become less numerous and less formidable. The plants, too, will be studied in their natural relations, associated with their kindred genera and species, and in their natural families. Structural Botany is consequently made the basis of the arrangement. The logic and taste will be gratified by the systematic method, and the improvement in some of the particulars. A brief synopsis will make this obvious.

The *elementary* tissues and *compound* organs are first presented. This leads to the obvious great division of plants,

a. *Flowering or Phenogamous* plants, produced from *seeds.*

b. *Flowerless or Cryptogamous* plants, produced from *spores.*

To this division another name may be given from the seeds and spores, the former designating the *Cotyledonous*, and the latter, *Acotyledonous* plants.

The *flowering* plants are divided into two great natural divisions, *Exogens* and *Endogens.*

1. Exogens, grow by layers or *external* accretions, bear *reticulated* leaves which fall off by an articulation, have *discotyledonous* seeds; bark, wood and pith separable.

2. Endogens, grow by *internal* accretions, bear leaves with *parallel* veins, have *monocotyledonous* seeds; bark, wood and pith not separable.

The Exogens are divided into

Class I. *Angeiosperms*, having covered seeds, as in the oak, pink, lilac.

II. *Gymnosperms*, with naked seeds, as in the pine, fir, &c.

The Endogens are divided into

Class III. *Aglumaceous*, destitute of glumes or scales, as Orchis, Lily.

IV. *Glumaceous*, have glumes or chaff, as the rye, wheat, and all the grasses.

The Cryptogamous are divided into

Class V. *Acrogens*, grow by extension of their point, as ferns, mosses, &c.

VI. *Thallogens*, grow into a flat expansion, as seaweed, lichens, &c.

The clearness and beauty of this natural system, thus dependent on structure and growth, command universal approbation. So far there is little improvement to be expected or desired.

CLASS I. *Exogens*, then divided into subclasses, depending upon the corol—as

SUB-CLASS 1. *Polypetalous*, p. 13, 2. *Monopetalous*, p. 168, and 3. *Apetalous*, p. 314. This constitutes the arrangement, more nearly approaching nature than any other yet proposed. Under these divisions are arranged the several *Orders* of the Exogens, in their improved form and description, and the genera and species lead to the desired result. It thus is evident that this work is unique in our country; unlike any other; superior in its application to any other; and giving the student advantages possessed by no other. It has deserved popularity where it has been examined and used. It elevates Botany as a study, as well as a science. It cannot fail of exerting a happy influence on the mind. C. D.

Rochester, June 14, 1845.

TRANSACTIONS OF NEW-YORK STATE AGRICULTURAL SOCIETY, together with an abstract of the Proceedings of the County Agricultural Societies, 1841-2-3-4.

The current age is a remarkable one, if for nothing else, from the fact that every thing of a public nature is done through large organizations. Whether in morals, benevolence, politics or science, all is done by conventions or societies. The people of the present day are unmovable, individually, and we are inclined to the belief, that, were it not for the movements of masses organized and combined, such would be the apathy of men, that they would sink back into a solitary, selfish misanthropy. Great impulses are necessary to set the wheels in motion, and when started, the steam must be kept up almost to the bursting point, or the huge car of society begins to retrogade towards utter inactivity.

We have sometimes felt disposed to find fault with such a state of things, and look upon it as furnishing evidence of a sort of negative tendency to dissolution. But when we remember that the world has long been, and is still becoming more and more artificial every day, we settle down more satisfied to let it take its own course. Yet we are by no means indifferent lookers on, while the play is acting. We watch with deep interest the movements of all the old machinery, and when any new is introduced, we regard it with still deeper interest, to ascertain how it will work in, cog for cog, with the old. We seem to live in the second edition of the age of the pyramids—revised and somewhat improved, perhaps—but an age when thousands must combine to build up those structures which posterity will gaze at, and wonder, as we do at the huge piles on the sands of Memphis. That was an age of brute force, leaving vast records of what human strength could do. The improvement in this is, that science, and the knowledge of the laws of nature, are superseding physical power, and steam is made to do the labor of man. Thus the monuments which we shall leave, are those which, invisible to the eye, are built up in the heart of every child that shall ever be born.

It must be acknowledged that to this law of association, if we may call it so, is the present state of society to be attributed; and in no other place do the effects of this law show themselves more plainly, than in the business of agriculture. We are perfectly aware, that the benefits of association for the promotion and improvement of farming, are generally attributed to the concomitant circumstances, such as the Fairs which are held annually, with great excitement—the spirit of emulation aroused by premiums and the comparison of each other's products, &c.; but we profess to look deeper, and account for it upon this great law that is governing the age. Men will do great things in masses, when they will do nothing singly. But attribute it to what cause we may, nothing can be plainer, to a mere superficial observer, than the fact that since the institution of agricultural societies, a great improvement has been made in the art and science of farming. And if they continue to be conducted on plans commensurate with the demands of improvement, we may safely congratulate ourselves upon the prospect of a still more rapid growth in prosperity, and the attainment of no mean degree of eminence in agricultural operations.

The first agricultural society in the State of New-York, was organized on the 26th of February, 1791, in the Senate Chamber, in the city of New-York. Chancellor Livingston, Simeon De Witt, and Doctor Mitchell—all names of note—were engaged in the enterprise, and drew up the "Rules and Regulations for the Government of the Society." The object of this association was not solely the encouragement of agriculture, but it was for the "Promotion of Agriculture, Manufactures and Arts." The Society was not incorporated till the 12th of March, 1793. Immediate efforts were made to render the enterprise useful. A circular letter was issued, asking information on various points of husbandry; and it is worthy of remark, that the same questions, or many of them at least, may be, and are asked, at the present day; and so little attention has been given to them, that they still remain unanswered. What effect this Society produced upon the condition of farming, at that time, we are not able to ascertain. The volume of Transactions published in 1801, contains numerous essays and accounts of experiments, far superior to many of those put forth at the present day, and evincing an interest in the subject, which would do honor to many men of similar stations now. These articles are from the pens of such men as Dr. Mitchell, Robert R. Livingston, Ezra L'Hommedieu, &c., &c.—men whose hearts were in the cause, and whose efforts deserved the reward of success.

The discoveries of modern science had not opened to them the relations of organic and inorganic matter—the true constitution of plants, animals, and the soil—and consequently, their reasoning in regard to the action of manures and the life of vegetables, would appear to us very unphilosophical. But let us remember, that to our children, our's may appear equally so. Satisfied as we may be that we have arrived at the truth, it cannot be denied that the astonishing discoveries of the present age, instead of fixing as absolutely certain any conclusions, have a tendency rather to make us fear that a future day may show us to be in equal error, with our predecessors.

In some things the writers of that day have taken a step in advance of our own times. As an example, take the following extract, from an essay "on the growth and nourishment of plants," in which the writer has gone beyond that sect who insist upon the atmosphere as the only source of carbon to plants.

Page 336. "I believe we are on safe ground, when we say the plant receives no nourishment from the earth. Many have been the experiments of raising plants, shrubs and trees, in boxes filled with earth; and this earth being weighed after the shrub or tree had grown to maturity, and after taking out the tree, the dirt is not found to have lost any of its weight. It thence follows that the earth is only a bed to hold up the plant or the tree that it may receive its nourishment from some other source."

Here will be seen at a glance the whole doctrine of atmospheric food, which a certain class of physiologists contend for, and have sought in modern times to establish by reference to the same experiment. But we must enter our unqualified protest against the doctrine as a whole, because—

In the first place, we do not believe the experiment. The light which chemistry has lately thrown upon the structure and composition of vegetables, makes the contrary too true to allow us to believe any such thing. The fault lies in the way the experiment has been tried, as can readily be shown. Thus—

The ash left by burning dry oak wood with the dry leaves amounts to only 4.71 lbs. in 100. Now supposing the trees experimented upon to contain the same proportion and to have been raised from the seed in the box, and there to have attained the weight of 5 lbs., then the quantity of ash left would be but .23 of a pound, which is all the inorganic matter that could have have been extracted from the soil, and being so small, would very probably not be observed in weighing, especially when the difference in the moisture of the soil might have compensated for the whole loss.

Again, if the soil serves only to keep the tree in an upright position, why will the tree not continue to thrive if cut off directly above the roots and inserted in the soil, or merely propped up perpendicularly. Too much is now known of vegetable physiology to leave room for such theories. Plants draw nourishment from the air, but they draw equally important food from the soil.

The practice of very many farmers at this day would seem to be built upon such a theory as that we have noticed. Although the use of manures is well known, but probably not thoroughly understood as regards the mode of their action, and though their application is insisted on by all rational farmers, yet multitudes seem to view them as of little or no consequence, and suffer them to lie and waste unused.

Such theories as this are, however, only the exceptions in this volume of the Transactions. As a general thing, it contains an amount of valuable common sense matter, well digested opinion, and strong facts, which is surpassed by no volume published since, in the more palmy and flourishing years of the society.

From the early part of this century till 1832, we find no great evidence of the progress of this association. At this time a number of gentlemen assembled in Albany and organized again an agricultural society. Little interest, however, was excited in the subject, and it sustained little more than a nominal existence, although incorporated by the legislature, till 1841. It was then reorganized, and an appropriation was made, by the state, of $8,000 a year for five years, to be applied by the state and county societies, for the promotion of agriculture and household manufactures in the state. From this time we may date the more important operations of this association; and for the four past years of its existence it has annually given to the legislature a large volume of reports of its doings, to which is added a large amount of matter which is unfortunately quite unconnected with its operations, and much of which, it is proper to say, is mixed up with vague speculation and some gross errors. We regret that we are compelled to say this, for those who are employed in the preparation of such books should be exceedingly careful what kind of matter is incorporated in it. The farmer is not as yet a man of science, and is not consequently capable of separating what is wrong from what is right. The desire for knowledge relating to his business is gaining ground, and is already very extensive. All that is written on the subject is eagerly sought for, and a large portion of intelligent agriculturists are ready to seize upon any counsel that promises to show them how they may increase their crops and compete with more productive portions of the country. Thus they are ready to receive as true the principles advanced by prominent men in whom they have been accustomed to place confidence; and if the practice does not prove the doctrine true, they are disgusted and discouraged, and often ready to recur to their old condemnation of book-farming. The agricultural population is becoming every year more and more ready to enter upon the improvements which have within a few years been introduced. But they must have the results of their own experience to confirm their experiment or the whole is counted false. They need cautious, candid encouragement. All that is recommended for their benefit must be true, and bear out its recommendation in practice. They abominate speculation and mere theory; and thus those visionary enthusiasts who would raise farming by one grand effort to perfection, will find them a capital check upon their headlong enthusiasm.

We will not be understood as condemning the volumes before us. On the contrary we give great credit to the state society for the work. At the same time we unhesitatingly say, that they contain much that had better been left out, for it has no connection with agriculture; and some which had better never been written, for it is full of error, and as such renders the authors and the Society liable to censure. The latter appears under the sanction of science, whilst true science will reject it.

We think the Society have erred in the choice of men to deliver the addresses at the annual Fair. Not but they are men amply sufficient to do justice to the high claims of agriculture; but it is a subject which needs not eulogium nor praise. These it receives from all men, and its highest honor is the prosperity and happiness it confers upon a nation. The farmer needs instruction, not praise; and we submit it as our humble opinion that an address filled with good practical information—examining briefly the principles of the practice of agriculture, and setting forth inducements to advancement in knowledge of the art, would be vastly more useful to the thousands of hearers, than poetic rhapsodies. And in saying this we are conscious that we do not speak unadvisedly. We know it to be the opinion of a large—we might perhaps say—the largest portion of the farming community, who attend these Fairs. They are common sense men and want to hear common sense.

We must make an exception here in favor of the last president of the Society, in all whose productions we notice that intimate knowledge of the wants of the farmer, and the capacity to meet them, that makes his writings all assume a highly practical character. But we would not be called fault-finders, any farther than we deserve it, and in these remarks we feel confident that we are correct.

Since the state, by legislative aid, came to the rescue, and began to uphold its own true interests, by encouraging the farmer, the state and county societies have made rapid advance. Many of the counties soon organized societies under the new law and established annual Fairs, which have generally been kept up, and with increasing interest. In some counties, however, and some of them not less populous or less interested in agriculture than others, no movement has even yet been made. From some cause, which we cannot fathom, an extensive prejudice fills the minds of farmers in some parts of the country against the use of such societies. This is not as it should be. In this, all should be united. In union is strength; knowledge is catching in some measure, and when men associate in a common effort they can do what they please. The results of those societies which have gone into operation, show this to be eminently true in regard to farming. We will not say that all is owing to this, but to whatever cause it is attributed, we must give large credit to this for the rapid and real improvement which has been of late so extensively seen in the farming interest. These societies have done good and are capable of doing much more. But the opposition or even the disaffection of a few may essentially hinder their progress.

A good feature connected with this subject, is the formation of farmers' clubs for the free and social discussion of the various subjects connected with the pursuit. These, we believe, wherever they have been formed, have exerted a salutary influence and have awakened a lively zeal in those who are engaged in them. The reports which have been published in numerous papers, show the discussions to be of a somewhat rambling conversational character, but we will not say that they may not be better on this account. We are, nevertheless, inclined to the opinion that a little more order and system would be preferable.

In 1841, the State Society held its first annual Fair under the new organization at Syracuse, and in the following years at Albany, Rochester and Poughkeepsie. They seem to have been characterized by great enthusiasm and increasing interest. They have formed an attraction not only for the farmers of this state, but those of some of the most distant states in the Union are seen there. And the manufacturer also sends there his wares, which have formed a very important item in the great variety exhibited. The crowds collected on these occasions, amounting to several thousands, are the strongest evidence of the hold they have taken upon the public mind. The present year is the last of the term for which the appropriation was made by the state, but the legislature at their last session have renewed the grant, and we may look with confidence for continued zeal and increasing prosperity and usefulness, unless, among other fruits, some apple of discord should find its way into the concern.

For each of the past four years, the Society has made a report of its doings and those of the county societies. These form the volumes whose title is placed at the head of this article. With some portions of these books we might lawfully find much fault. But we will pass that by for the present, lest in denouncing individual errror, we should be accused of being inimical to the whole. What fault we have found above, we were, for this reason half inclined to blot out after it was written. But, as Pilate said, "what I have written I have written."

And we will close this article with a few suggestions to such individuals as have the management of the numerous Fairs that occur annually in the various parts of this state.

1. Would it not be well to diminish the number of premiums on animals, and increase the number and amount of those on the products of the farm and garden, and household manufactures. The reasons for this suggestion are, in few words, these : The object of premiums ought to be to encourage and stimulate the real farmers—those who live by tilling the soil. Men of large fortunes can pay enormous prices for fine horses or high bred cattle, and can always carry off the prize, although it is a matter of no consequence to them, inasmuch as they have purchased them for their own pleasure and use. In these the common farmer can offer no competition. But in the products of the soil he can vie with the wealthiest, if he will study his business, and especially if the prize depends upon the economical production of a crop. The interests of the country also, we think, require this, for the direct produce of the soil is of the first importance in the support of the people.

2. We would suggest the offering of premiums, and so large as to attract proper attention, on new articles of culture. It is highly probable that by this means those soils which have ceased to bear their former burdens might be made to produce abundant crops, and thus add to the wealth and happiness of the nation.

3. Complaints are sometimes made of favoritism in conferring premiums. This might be avoided by having all articles numbered

instead of having the maker's or owner's name attached. It would at least take away all excuse from grumblers.

4. We would suggest the propriety of having lectures, or at least addresses, of a practical character, as well as scientific, delivered at these Fairs. They should be short and comprehensive, and two or three may be given on each day. Besides the instruction imparted at the time, they would serve to awaken an interest which would spread itself into all neighborhoods, and be productive of lasting benefits.

And lastly, we would suggest the importance of at least attempting the formation of clubs under the auspices of the local societies. We are satisfied that this is the true way to stir up the farmers of this country to improvement—to cultivate their minds under the influence of social feelings, and thus secure the two great objects of prosperity and happiness.

The Farmers' and Emigrants' Hand-book: Being a complete guide for the farmer and the emigrant, comprising the clearing of forest and prairie land—gardening—farming generally—farriery—cookery—and the prevention and cure of diseases; with copious hints, recipes and tables: By Josiah T. Marshall, author of the "Emigrants' True Guide." Second edition, revised. New-York—D. Appleton & Co., 200 Broadway. Philadelphia—Geo. S. Appleton, 148 Chesnut street. 1845.

Probably no book has been more needed for a few past years than such an one as this. In the tide of emigration to the west, hosts have gone utterly ignorant of the wants and trials of a new country, and consequently quite unprepared to meet them. This we know full well from personal observation, and often in that country has it been our lot to condole with families who had gone there full of hope and expectation, but knew not that they were leaving behind them all the comforts they were to experience for years. Happy, comparatively, they who had the hardihood to struggle through the trials and sickness they met, and find success at last. Such a book as this before us would have been invaluable, and we advise all who think of emigrating to buy it. We see only two things in it to find fault with. The author advises shooting birds that trouble the fruit—and he has given the old rates of postage instead of the new. This is rather singular in a book published since Congress adjourned.

RHEUMATISM—ACUTE AND CHRONIC: A Prize Essay by G. C. MONELL, M. D., Newburgh, N. Y. Published for the Orange County Medical Society, pp. 144. H. G. Langley, 8 Astor House, N. Y.

WE notice this essay for the purpose of commending it to our brethren in the profession of medicine. Restricted as such essays must necessarily be, it still furnishes almost all that is known of a practical value as it regards cause, symptoms, diagnosis and treatment. The essay is well put together, and its several parts are well proportioned. It furnishes a great many authorities under the several heads, which will be found of considerable value to the reader, as it will enable him to pursue the subject to a greater extent, if he chooses. A physician cannot study too thoroughly the several kinds of rheumatism, inasmuch as it is one of the most common diseases of our climate, all classes being subject to it, except children. Upon the whole, we regard this work as a model essay, being in spirit, style and arrangement worthy of imitation by all who write monographs of our diseases.

THE FARMERS' LIBRARY AND MONTHLY JOURNAL OF AGRICULTURE, No. 1; July; 1845: Edited by John S. Skinner. Greeley & McElrath, Tribune Buildings. $5.00 per annum.

JUST as we are going to press we have seen the 1st No. of the above work, which of course we have not had time to examine. The first forty-eight pages are filled with a reprint of Petzholt's Agricultural Chemistry; the remaining sixty-four pages with essays &c. A fine engraving of Stephen Van Rensselaer forms the title page, and in the body of the work is an engraving of the Southdown prize wethers exhibited at the Smithfield Show, and one of the vegetable silk plant from Tripoli.

The name of the editor will be sufficient guarantee of the character of this journal, which we cordially recommend to the public.

CORRESPONDENCE AND MISCELLANY.

EXPERIMENTS

SENT BY THE DORCHESTER FARMERS' CLUB.

Having stated in April last, that I had on hand an experimental investigation of the efficacy of the several new philosophic nostrums, recently offered to the agricultural community, it may be expected that I should offer, at least a partial report of their progressive indications, so far as the advance of the season may allow.

I regret to say, they have, in no respect, exceeded the moderate views I had entertained of them, and freely expressed on the occasion alluded to; yet I would feel wholly unauthorized, to pass a conclusive judgment upon them, until final results, obtained by myself, and others, may have fully developed the degree of character to which they may be entitled.

The guano, and the Hauterive solution, are alleged to be *protective* against *Insects*, as well as *nutritive*—and to promote the growth of vegetables, in an extraordinary degree.

To these two points, I will concisely call your attention, as far as observation has enabled me.

I have this season used the guano steep with a portion of my seed corn; and agreeably to the rules prescribed by the venders of the article; that is, about 80 hours, in the solution, which was prepared as directed by the same authorities. In the Hauterive solution, the grain was steeped as directed from 18 to 24 hours.

The field in which the experiments were made, contains about fifty acres, and was placed under a winter furrow—as usual in my cultivation—and manured, broadcast, in the spring—excepting only about two acres left for a fuller experiment.

Several acres, embracing the manured and unmanured, were planted with each of the steeped grains, as well as the unsteeped, and the whole accurately marked—and without these marks they cannot well be distinguished—no superiority indicating the steeped portion, is discernible.

No part of the field is injured by the well known cut-worm, (*phalena devastator*,) which has committed great ravages in the country generally; but I owe this exemption to the winter furrow, which exposed the pupa to frost; indeed, the whole being free from this pest, the steeps cannot claim credit for it.

But unfortunately for these steeps, as *protective* against *insects*, several spaces of some square perches of my corn have been infested by numerous aphides on the roots, which I was led to detect by the yellow color and stunted growth of the plant; the microscope disclosed the agents of the mischief, which, at their first period, were not visible to the naked eye, though subsequently, plainly so; these injured spaces were partly within the range of each of the steeps—unequivocally contradicting the idea of their *protective* character. Upon some portions of the injured spaces, I applied the guano in powder, mixed with three parts earth, without any advantage yet experienced from it—but possibly there may be, in more time. With the same view to this insect, I have lately applied a strong solution of the guano about the roots, which will probably have an earlier and better effect. Indeed, I have no doubt this is the most economical and effective mode of its application for *nutriment* also; the whole dose will then come within the immediate command of the organs designed by nature to introduce it into the circulatory system, for the final purposes of the plant; and without waste.

I will here remark, that with one of the infested portions of corn, I made trial of a strong infusion of tobacco stems, pouring around each plant half a pint of it. In a few days—to my surprise, for I had supposed the case desperate—the plants thus treated, began to assume a green color, and are now improving.

It is to be lamented, that a branch of science (entomology) so intimately connected with the farmer's interest, should be so much neglected. Were the habits of the numerous insects injurious to vegetation, intimately understood, the farmer would have his antidote for the various tribes—perhaps infallibly at hand, on all occasions. A periodical entitled the "American Quarterly Journal of Agriculture and Science," lately established at Albany, New-York, conducted by Drs. Emmons and Prime—gentlemen of eminence in science—has commenced, in its second number, a series of articles upon insects injurious to vegetation, with descriptions and colored figures of the insects; price three dollars per year. This Journal should have a place in every farmer's library. Without attention to this important but neglected branch of science, the interests of the farmer will be eternally obnoxious to the fatal ravages of the numerous insects that are annually multiplying in kind and number, and frustrating his well planned and laborious designs.

An instance of a new variety of these formidable pests, has lately occurred in our neighborhood, which threatens our wheat crop, to an unknown extent. A member of our Club (Dr. Tubman) enclosed to me a few days ago, an insect from the head of his growing wheat, and feeding upon the grain. It is, as you will perceive, a minute species of the "Calandra" family. It is not the "Calandra granaria," which we have had frequently in our grain, when housed, which is a long, slender beetle; but this, the new one, is a short thick beetle—color silver gray, and four black dots on the elytra—that is, two on each. The most of this group are formidable enemies to the various kinds of grain.

I have placed on the table a small species of gryllus (grasshopper) which has, this season, for the first time, appeared in my tobacco beds, and done much injury. They were considerably abated by a powder composed of soot and sulphur, sprinkled over the beds before the dew had disappeared.

Now returning from this digression, to the manures, I will add that the poudrette, which on a former occasion, I informed you, I had prepared with sulphate of iron, I have recently applied to my tobacco crop, two spoonfuls to the plant—it is quite *inodorous;* and I think, *rich*—its effects will be reported when obtained.

I have in progress two experiments with electricity—*atmospheric* and *terrestrial;* with the former, as you have just now seen, in my garden I have been the most successful; the rows of radishes and corn were extended through the electrized space and on each side of it, and were planted at the same time and under equal advantages; those within the electric range—both corn and radishes, are as you have seen to-day, more than double the growth and luxuriance of them without it. The upland rice, which you saw, passing through the range, and out of it, was perishing from the drouth when the battery was applied, and no effect is seen or to be expected.

From the remarkably changeable temperature of the season, varying frequently from sixteen to thirty degrees in twenty-four hours, I was sanguine in the expectation of an unusual quantity of thermo-electricity, developed in the eastern atmospheric current, and I have not been disappointed; but how the *galvanic plates* have failed I am at a loss to conjecture.

This battery was settled precisely under the most recent method and authority; the plates of copper and zinc each four feet long, and fourteen inches wide, were connected by a copper wire trebled and twisted, to ensure a full capacity for transmission, and all buried.

Within the range were planted forty grains of corn; as yet none of the plants evince any effect, except those nearly in contact with the *connecting wire* and with the *plates of the battery;* and those, as you have seen, are palpably injured in growth and appearance, compared with other portions; *possibly* from an excess of the *electric aura,* collected and accumulated by the long continued drouth; or waves of the free electric fluid—the all pervading ocean—collected by the battery, and insulated and condensed by the excessive aridity of the intermediate earth—by which the antagonist forces were held in suspense; thereby exerting an undue energy upon the insulating walls and the immediately adjacent bodies within their sphere; analogous to the case of antagonist electricities, *hovering in proximity* in the *clouds* and *earth,* without power to overcome the resistance of the dry atmosphere between them, and quiet the disturbed excitement.

I have another battery, planted a few days ago, embracing some tobacco plants and potatoes, and on a plan by which I may probably unite the forces of the *thermo and hydro electric currents,* with which I hope to be more successful, unless the *drouth be repeated,* and the *caloric suspended*—improbable events we would hope.

Finally indeed, I may emphatically say—I offer for your inspection some ammonia which, I obtained from rain water, after the late long continued drouth, when much of this article so essential to vegetation is necessarily accumulated. You will perceive that this ammonia retains the offensive odour derived from its putrid origin—the dead carcasses of the earth;—this fact, stated by Liebig, is so singular, that I confess my incredulity until, a few years ago, I satisfied myself of its truth in regard to both snow and rain.

I have nothing to add, but to ask your pardon for the long race I have taken on *one of my hobbies*, when really I had only intended a short canter.

JOSEPH E. MUSE.

Saturday, June 28, 1845.

PHILADELPHIA AND HORTICULTURE.

Gentlemen—It is a fact worthy of notice that in our large towns and their immediate vicinity, the most energetic and best directed efforts for the improvement of the various branches of agriculture, spring up. Little as we might expect to find here a taste for rural pursuits, it is nevertheless true, that within the brick and mortar walls of the city there actually is found a zeal and enterprise, far outstripping the most active energies of the country. Very many there, are taking a deep and strong interest in the progress of agriculture, and directing to the subject an untiring care and patient perseverance. And we need not marvel at it; for I am ready to confess the surprise I feel, that any man who loves nature and worships nature's God, if only in a little corner of his heart—can ever be content—shut out from the green fields and trees and flowers, and know no change of season but from the burning sun of summer to the frosts and snows of winter. And I am not surprised, that under such circumstances men should try even on their few square feet of soil, to produce some of the fruits and flowers that waken remembrances of the country.

But this is not all. Our cities are of necessity the head quarters of science; and it is there that its application to the arts must be tested. It requires leisure and money to carry out experiments in any branch of knowledge, and the farmer has no great share of either. If then he labors to supply the large cities with food, let him remember that he may not only receive an equivalent in money, but also in that knowledge which is both an aid to his labor, and a special source of happiness to himself and his children.

I was not fully aware of the extent to which these facts are true, till I made a visit a few days since to the city of Philadelphia. I am no sight seer, and consequently did not employ much time in looking up the lions of that city; although I did more in that way than I am in the habit of doing. But I was gratified with what I saw of the horticultural enterprise of many gentlemen there. I was fortunately able to attend one of the meetings of the Pennsylvania Horticultural Society, connected with a semi-monthly exhibition of horticultural products. The show was not large on this evening, but it was good; consisting principally of flowers. I was, however, particularly attracted by a few strawberry plants exhibited by Dr. Brincklé. This gentleman—I called at his house but was unfortunate in not finding him at home—has devoted himself with singular perseverance to the producing of new varieties of this plant, in which I understand he has had great success. He crosses different varieties with judgment, and has produced some remarkably fine fruit. But a fact worthy of notice is, that all the plants are grown in pots or boxes in a room in his house, with a southern exposure during the cold weather, and in the small yard in the rear of his house in summer.

The Pennsylvania Horticultural Society was instituted in 1833, and now numbers more than 700 members, paying annually the sum of three dollars each, by which means and the amount raised at the exhibitions, a sufficient fund is obtained for carrying on its operations with vigor. Its exhibitions are open to all for the display of their productions and for competition, whether members of the society or not, its object being the advancement of horticulture universally. In many societies I have no doubt a great hindrance to their progress and prosperity, as well as to the good they might do, is to be found in the fact that every one is required to become a member before he can become a competitor.

This society holds its stated meetings on the third Tuesday evening of each month; and during the season of fruits and flowers intermediate meetings are held. It has a library containing upwards of four hundred volumes for the use of members, and it consists largely of the most valuable works on horticulture. No wonder, with such a society, under efficient officers, that Philadelphia holds the place it does as a horticultural city. Probably no city in this country is before it, unless it may be Boston, in point of fruits.

Most of the flowers I saw at the exhibition, were from the garden of R. Buist, 140 South 12th street. I visited the establishment of this gentleman, and spent an hour pleasantly walking about his grounds and greenhouses. Mr. B. is the author of an excellent work on the cultivation of flowers, and one called "the Rose Manual." The varieties of this favorite flower have become so numerous as to require a work containing full directions. This want Mr. B. has supplied.

Mr. B. mentioned some experiments he had been trying with guano. One table-spoonful in a four inch pot of pure sand destroyed the germinating power in seeds. When one-fourth part of that quantity was used the seeds germinated and grew well. With two table-spoonsfull of artificial guano the effect was the same as in the smaller quantity of the natural guano, showing a difference of 1 to 8 in favor of the natural.

I spent an afternoon very pleasantly at the house of Doct. Mitchell, six miles from the city. This gentleman has made great improvements in the short space of three years, in which he has been upon his farm. But persevering enterprise will accomplish in a short time, what many a man would require a life time to effect. The Doctor is devoting his personal attention to the cultivation of foreign grapes. He has a large grapery under glass, and has it stocked with choice varieties, which he tests carefully, and rejects all that do not suit him. At the time I saw them, the vines, of only three years growth were loaded with tempting clusters, but not yet ripe. One cluster I must mention in particular, and, mark reader, upon my own credit for veracity—for so Doct. M. charged me, lest he might lie under the imputation—but no matter, the the fact is a fact for I helped him measure it—the cluster was *two feet, four inches and five-eights* in length, and exactly *three feet* across the wings. This was the grape of Palestine; and reminded me of those described in the Book of Numbers, 13th chapter, 23d verse—"And they came unto the valley of Eshcol and cut down from thence a branch with one cluster of grapes, and they *bore it between two upon a staff.*"

I was desirous of visiting the farm of James Gowan, Esq.; but he was absent from the city and I missed the opportunity. You have probably seen his report of his farm and its management, which he made to the Philadelphia Agricultural Society last fall. Farmers would do well to read it and imitate him.

I will take this opportunity to express my thanks to those gentlemen, through whose hospitality and kind attentions I was indebted for many happy hours in Philadelphia.

Yours truly, P.

Lyonsdale, Lewis county, N. Y., June 2, 1845.

Prof. Emmons:

Dear Sir—I called at your room just before I left, but did not see you. I wanted to see you in relation to the analysis of the soils which I left with you. If you will send it in an answer to this, you will very much oblige

Yours truly,
D. S. HOWARD.

P. S. The ore bed of which I left you a sample, is likely to prove truly valuable, as it seems to be inexhaustible, and the deeper it is dug, the purer is the ore. D. S. H.

Analysis of the two specimens of soil referred to in the above letter. The first is said by the writer to be really good for nothing.

First Specimen.

100 parts contain	Silex,	92
	Water,	5
	Per ox. of iron and alumine,	3
	Vegetable and animal matter,	1 to 2

From this examination, it is evident that it is lacking in some of the essential elements of fertility. Lime in any of its combinations does not exist in it. It is also deficient in vegetable matter.

Plaster, with clover, would do this soil good. But probably a better course would be, to treat it with compost of peat, straw or any vegetable substance, and ashes, mixed with barnyard manure. Still, it appears as if the attempt to renovate such a soil, must depend upon circumstances. If situated not far from the barnyard, or a muck swamp, it may well be attended to. Under other circumstances, it would involve considerable expense, and probably loss.

Second Specimen—much better Soil.

100 parts contain	Silex,	74
	Water,	4.25
	Per oxide iron and alumine,	5
	Vegetable and animal matter,	15.5
	Lime,	.5

It was not examined for phosphates.

What is interesting to notice in these two samples of soil is, that at first view, they look exactly alike, and a person might be deceived in the first. On washing it, however, and especially after the action of acids, it is seen to consist almost entirely of a gray sand, derived from granite probably, as it is mixed with a few grains of feldspar.

South Norwalk, May 31, 1845.

DEAR SIR—In connection with this I send you a specimen of a kind of soil found at a locality in this vicinity, which some of our farmers have lately begun the use of as a manure, though being ignorant of its composition and properties they consider it only an experiment. It may be very common, though I have never met with it. It covers an area of some acres, I should think, and its depth is not ascertained. A pole has been sunk in it to the depth of twenty feet or more without finding bottom. If you are familiar with it, so that you can inform us what it is; whether mineral or vegetable matter, or a mixture of both, without the labor of a chemical analysis, it would be a favor.

Yours sincerely, JAMES H. COFFIN.

This is not properly a soil, but *peat* of excellent quality; and where fuel is scarce would be good for that purpose. For agricultural purposes it is of course invaluable, containing about 95 per cent of vegetable matter. Its ashes we have not examined. Its greatest benefit is obtained by mixing with ashes, potash or lime, for some time before being applied, or by forming it into a compost with animal manures. If ashes are used which have not been leeched, from sixteen to twenty-four bushels (according to the quality) are to be mixed with one cord of peat, and suffered to lie in a heap for a few days, although it is often put on the ground immediately. If potash is used, about thirty pounds are dissolved in water, and the same quantity of peat as before wet evenly with it. But the most common, and by far the easiest way of using it is as a compost with animal manures. For this purpose the barn-yard is to have a thick layer of peat put upon it, which may be mixed with the manure of the yard by the feet of the cattle; and thus it serves the double purpose of increasing the actual quantity of manure by being itself converted into it, and also of absorbing the gases and liquids which might otherwise be mostly lost.

Still another mode of preparation is, to make a pile of alternate layers of peat and stable manure, using one load of manure to two or three loads of peat. This should be covered with a thick layer of the peat, to prevent the escape of the gases formed by the action which takes place in the mass. Or the peat may be well soaked with the liquid manure of the stable yard, which will have the same effect. They should remain in this state until fermentation takes place, when they are to be put upon the land.

For any of these processes the peat should be dug six months or a year beforehand, and exposed to the action of the atmosphere, and afterwards made into compost.

South Stephentown, April 14, 1845.

Sir—I have been reading for a few days past the two numbers of the Quarterly Journal which I procured at your office.

I am much pleased with the work, and confidently expect that it will yet do far more for agriculture, than any thing of the kind which has been published in this country.

I have been particularly interested in the experiments of Mr. Campbell, on the effects of soaking seeds in chemical solutions; and have determined to repeat one or two at least of his experiments, provided the expense will not be too great.

I should like to try the effect of sulphate of ammonia on about two acres of land where we intend to sow oats. If you can inform me what will be the expense I shall be much obliged to you. Mr. Campbell states that he "prepared the various mixtures from the above specified salts, exactly neutralized." I supposed that the sulphate of ammonia was neutralized by the addition of some alkali, as potash or soda; but I am not sufficiently versed in chemistry, to determine either the substance which should be used or the quantity which is required.

Respectfully yours, SAMUEL P. ROLLO.

We have not seen any account of the final results of Mr. Campbell's experiments, but we have regarded them as doubtful in some respects. Soaking seeds in mineral solutions is by no means a new thing, and is attended with some good effects, but we are not ready to receive the full extent of Mr. C.'s faith. The process no doubt gives a vigorous start to vegetation, and enables the plant at an early period of its growth to prepare for its future support. It will also serve to protect the seed, and perhaps the young plant from the depredation of worms.

The expense of preparing the salts we cannot state. They could, however, probably be procured of any druggist, and as sold by them are already "neutralized." We shall be glad to hear the result of the experiment, and of course recommend a portion of the field to be sown with seed that has not been soaked, in order to ascertain the effect correctly.

Our friend and correspondent Wm. Case, Esq. of Cleveland, Ohio, writes thus:

I wish I could get some information relative to the application of Galvanism and Electricity to Agriculture. We have nothing of the kind here. I have tried Galvanism unsuccessfully—probably owing to the drouth, the return current passed back through the deep and damp ground far from the roots.

In answer to which we would say that we are not at all surprised at the result. The truth, however, in the matter is, there is nothing to be expected in the premises. It is not many years since the story was going the rounds, that cress-seed was planted in the morning, and was grown in season for the dinner table by the aid of electricity. The cress story, and the last story from England, detailing the wonderful effects of electricity, belong to the same class. Both are doubtful.

GREATEST IRON MINES IN THE WORLD.

In Newcomb, Essex county, N. Y., in one mine, there is sufficient ore within two hundred feet of the surface to make eighty million cubic feet of iron. Two other mines, within two miles, are nearly as extensive as this; and at all, the ore may be quarried out to the open day like flagging stone. To increase the value of these mines, they are in the midst of a wilderness of wood, and situated directly upon a great water power. The western states abound in lead and copper; the country south of Lake Superior in copper and silver; the southern states in gold. Pennsylvania, Ohio, Illinois, Indiana, with many others, in inexhaustible beds of coal, associated also with iron ore, and all these in a country rich in the great staple of the vegetable kingdom. Well may we inquire, what country abounds so much in the elements of prosperity as our own? And let us rejoice that these elements are neither owned nor controlled by a despot, but belong to the people.

LEAD, SILVER, AND GOLD MINE IN NORTH CAROLINA.

This mine is in Davidson co., ten miles southeast of Lexington. It varies in the amount of the valuable metals which it yields at different depths.

At the depth of forty feet, the ore yielded, when dressed, fifty per cent of lead and from twenty to one hundred and twenty ounces of silver to the ton of lead. The value of the silver varied from $1.80 to $2.00 per ounce; its price being enhanced by the large proportion of gold found in combination with it at this depth. At sixty feet the ore had increased in richness; and the greatest value which portions of the ore had attained, amounted to five thousand ounces of silver to the ton; but those were only small portions. The silver is in a metallic state. The average yield is one hundred and twenty ounces to the ton. The value of the whole yield of the mine for twenty-seven months, was two thousand six hundred and sixty-one pigs of argentiferous lead, yielding silver and gold to the amount of $13,288.68.—*Taylor's Reports on the Washington silver mine.*

ARTICHOKES.

We agree with the Prairie Farmer, that Artichokes are hardly worth cultivating. They are not so nutritious or prolific as potatoes, and will certainly be attended with more trouble and labor and exhaustion of soil, if a business is to be made of their production.

HENS,

To be kept laying through the winter, must have warm quarters and be fed considerable animal food.

In order to fatten fowls rapidly, they should be well supplied with charcoal, broken into small pieces. They will become very fat if shut up and fed on this substance alone.

EXTRACTS FROM DOMESTIC AND FOREIGN JOURNALS.

PROCEEDINGS OF THE AMERICAN ASSOCIATION OF GEOLOGISTS AND NATURALISTS;

At the Annual Convention, held in New-Haven in April, 1845; with remarks by one of the Editors.

The gentlemen composing the Convention, assembled at the old dining hall of the boarding house back of the Centre College Building. About forty persons were present, and enrolled their names. Among them we find the following:

Dr. Barrett, Middletown;
Prof. Silliman, New-Haven;
J. D. Dana, do
J. D. Whelpley, do
B. Silliman, Jr., do
Prof. Olmstead, do
Prof. C. U. Shepard, do
Dr. J. Bacon, Boston;
J. E. Teschemacher, do
Francis Alger, do
Dr. Charles T. Jackson, Boston;
Dr. D. Humphrey Storer, do
Prof. C. Dewey, Rochester, N. Y.;
Dr. Stephen Reed. Lancaster;
Prof. J. Johnson, Middletown;
Prof. J. R. Loomis, Waterville, Me.;
Prof. H. D. Rogers, Phil.,
Prof. J. W. Bimly, West Point;
Prof. H. H. Haldeman, Phil.;
Prof. John H. Redfield, N. York.

The time of meeting was named to be half-past two. A little before three, Prof. Silliman rose and called the meeting to order; and expressed his regret at the unavoidable absence of Prof. W. Rogers of Virginia, who was to have acted as chairman. He therefore nominated Prof. Dewey of Rochester, N. Y., in his place; and this was carried, and Mr. Dewey took his seat as President.

The secretaries of last year were to have acted this year, but Dr. Lawrence Smith of South Carolina being absent, Mr. Dennis Olmstead, Jr., of New-Haven, was appointed in his place.

LIST OF PAPERS TO BE READ AT THIS MEETING.

On the Tracks of Birds and Animals found at Middletown, Connecticut; illustrated with figures of new species: By Joseph Barrett, M. D.

Evidence of Congelation in the Red Sandstone, as exhibited by Regular Triangular and Rhombic Marks of Great Distinctness.

On the Origin of the Constituent and Adventitious Minerals of Trap and the Allied Rocks: By JAMES D. DANA.

A Review of Chemical Theory: By Mr. WHELPLEY.

The Geology of the Country around the Mount Savage Iron Works, Maryland: By THOMAS H. WELD, of England.

The Geology of Mississippi: By Mr. WAILES, of Miss.

The Gypsum of New-York: By Prof. DEWEY.

Question of the Existence of the so-called Taconic System of the United States: By Prof. H. D. ROGERS.

The Geology of the Upper Missouri: By Prof. H. ROGERS.

Synopsis of the Fishes of North America: By Dr. D. H. STORER.

On a Chain of Erratic Serpentine Rocks, in Berkshire Massachusetts: By STEPHEN REED.

Communications or papers were also promised by Mr. Peter A. Browne of Philadelphia, Dr. Dean, and Lieut. Maury, in a day or two.

Prof. Silliman then presented a paper from Lieut. Hardy, R.N., on the Polecat Tree of Missouri, and the Holly Tree and Mistletoe, of England and America. He then went on to state that the President of the last year, by custom, delivered the address of the present year; but he had recently seen Dr. Locke, at Cincinnati, who was unable to attend.

The articles of the constitution were then read, by which it appeared that the name of this society is the "Association of American Geologists and Naturalists."

Prof. Silliman then read a paper from Lieut. R. W. H. Hardy, R. N., of Kilkenny House, Sion Hill, near Bath, England, on two subjects: 1. The Mapolite root bark; or polecat tree root bark of Missouri. 2. The mistletoe and holly barks, and their medicinal properties. Lieut. Hardy said that the bark of the root of the polecat tree, or mapolite, possessed wonderful and strong anti-scorbutic properties; and would cure gums that were sore, swollen and tender, even when the teeth were loose. He cured a man with it at Sonora, in Mexico, in three days, whose gums were so bad that his pillow used to be covered with coagulated blood of a morning. In general cases, it cured scorbutic gums, &c., in one day's use of the bark. He never knew it to fail. A piece of the root bark is to be masticated till all the pungent properties have left it; then chew another piece, and so on till a cure is effected. If the disease returns, repeat the remedy. He speaks of its anti-scorbutic properties in the same manner as we do of the properties of cinchona or sulphate of quinine as a cure for ague. Its therapeutical properties were first shown to him by an American, Mr. Gibson, a hunter or trapper, who married a woman at Opossum, in Sonora, Mexico, whose wife Hardy attended. It is found in great abundance on the banks of the Missouri, where its smell disgusts all who come near it. Mr. Hardy took some of it to England and has used it there with great success in every case. The second case was the produce of the mistletoe berries and the inner bark of the holly tree, (bird lime,) made into a plastic state and spread on cloth. Take three pounds of yellow beeswax and one pound of bird-lime; melt the wax over a slow fire; add the bird-lime by degrees, so as not to have it boil over; keep the vessel after this on the fire forty-five minutes, so that the bird-lime and wax are fully incorporated; spread this mixture on cloth and cut it into proper size for plasters. In cases of neuralgia, put the plaster over the part where the pain is. The plaster will retain its virtues till every part of it is worn from the cloth, and it does not materially interrupt the action of the skin. A repetition of it has equal effect. Also the carbonized ashes of the bark of the holly, mixed with its own weight of calcined alum, rubbed on the gums, where neuralgia proceeds from a tooth, will give relief. This is for neuralgia in all its forms, and the relief is almost simultaneous with the application. He has cured three cases in this way; he however alludes only to secondary effects, leaving the primary cause of neuralgia to be otherwise disposed of. But he thinks even the primary disease (when not the result of organic derangement) can be cured by this bark, when made into a salt with sulphuric acid, and given internally. Lieut. Hardy thinks the Druids of old knew these virtues in mistletoe and holly; and hence the great reverence they made the people pay to them; and got up the superstitious notion that a sprig of holly or mistletoe would drive away a demon: and thus the practice of decorating houses at Christmas and New-Year's therewith.

Dr. Barrett said that he did not know what was meant by that tree—the polecat. He was sorry the Lieut. did not send a specimen of it—a flower, a leaf or a piece of the bark. With regard to the mistletoe, the Lieut. could not have read Southey's "Book of the Church;" where Southey has shown up the way in which the Druids and priests of old humbugged the people by means of a very fine plant, thus getting a large share of their worldly goods. As for neuralgia, it was best relieved by taking off the surface with a blister, and then adding morphine.

President Dewey said there was no necessity for the Lieut. sending over a specimen of the polecat tree; it would be best known by its smell, (laughter,) wherever found, without any flower, bark, or even leaf: like certain animals, a knowledge of its whereabouts was speedily carried through the air to speak for itself.

Mr. J. D. Whelpley said that diseased gums were not difficult of cure—any powerful styptic would do this; a solution of nitrate of silver, for instance; or any acrid vegetable, either green, or as an extract. No external remedy will cure neuralgia—not even division of the nerve. It is supposed to be caused by pressure on the nerve where it passes out at the base of the skull. The mistletoe is useful only as a mere alterative, and has no virtue as an external application.

The second paper was then read; it was from Mr. C. J. W. Wedderburn, Prof. of Anatomy in the Medical College of Louisiana, on the "Influence of Atmospheric Pressure on the Tides." Prof. W. had made observations in regard to this, in the Bay of Pensacola. He observed that when the barometer ranged high, the tides were always low, and vice versa: the ordinary mean range of the barometer was 29.50; the ordinary tide range was from three to four feet in the Gulf of Mexico. During a strong N. E. wind, with the barometer very low, the tide at Pensacola would be very high; though the tendency of such a wind would be to force the water out of the bay. With the wind from the N. W., the tide would be very low, whilst the weather was very clear; a change in the barometer to a small extent would frequently produce a rise of from one to three feet in the tide. And thus he thought a tide table might be made by which any commander of a vessel could know by his barometer how much water there would be on the bar of a certain harbor in the Gulf; and this was of great value, because the depth of water on all the bars in the Gulf is very small, and at Pensacola it is only twenty-two feet. During N. W. winds there, they have generally clear weather, with the barometer ranging high and the tides low.

This was the substance of the paper.

The President here said that he had just remembered the name of a plant he had seen in a garden at Rochester, and no one knew how it got there; it was *selia trifoliata*; and smelling abominably was called the skunk tree; perhaps that was the *mapolite* of Lieut. Hardy.

Mr. Redfield said in relation to atmospheric pressure on tides, that half an inch of mercury only made a difference of six inches in the tide. Dr. Wedderburn has overrated the matter. So in the case of the N. E. winds causing high tides; a rise in the tide at Pensacola must be produced by some cause operating out of that bay. Thus a N. E. wind at Pensacola would be an East wind at Yucatan, and a S. E. wind at another place, forming, as it were, a circuit of winds, all tending to drive the water into the Bay of Pensacola.

Mr. Rogers said that some years since, great changes were observed in the level of the Swiss Lakes in times of great storms; and scientific men in Switzerland called on us to observe if there were similar changes in our great northern Lakes. Here is a great gauge to go by. Has any one made these observations on Lake Erie or Superior? Is there not some other force at work, much more than what is due to static altered pressure? Is there not a dynamic force at work, as well as that of the change in a superincumbent column of atmosphere? The dynamic force of the wind operating on the waves of a lake, sustained through hours and days, is of far more effect than mere static pressure, as indicated by the barometer.

Mr. ——, said that in the Lake Onondaga, after a long storm, the winds would blow the water high up on one side of the lake and leaving it low on the other. He had made the same observations on the action of the wind on water. In still air, a light wind *clings* to the water, and moves a surface of two or three inches in depth. After a long South or S. E., or S. W. storm, the fishermen on Long Island say that the whole sea is blown up on Long Island; this occurs every three or four years; it makes large sand banks; these are held there by short grass; the sea beats over these and forms Lagoons, and these are filled with fish, and these remarkable changes in the land are brought about by wind.

Prof. Johnston, of Middletown, said that at the gale of last September, the barometer fell 1½ inch, and the tide rose five feet at Middletown.

Prof. Loomis said that in the State of Maine the tide rises six or eight feet from long continued east winds; there would be no storms, but merely a long continued wind from the east. In one case the tide rose from this cause so as to move a log a distance of three or four rods, which had lain there for fifty years as remembered by the oldest inhabitant.

Mr. Johnston said that in the great gale of September, 1821, the steamboat left New-Haven for New-York; there was a great rise in the tide that night; the boat anchored off Morris' Cove; there was a ledge of rocks generally bare close by; the boat parted her cable and was lifted clear over the ledge safely into deep water by the rise of the tide.

Prof. Rogers said that much of this effect was also owing to the peculiar property of the adhesion of wind to water, one of the most beautiful laws in the economy of nature, otherwise the atmosphere would slide over the surface of the sea, and all the beneficial effects of storms would be lost. Another thought occurred to him: the ordinary beat of the surf would not throw up those coral reefs to the height we find them; it is done by the whole mass of the ocean, pressed on by the trade winds for a long time, that thus piles them up so far above the ocean level.

Mr. Redfield made a few observations on the effects produced on the shape of shores, by what are called converging waves, and their upheaval force.

Prof. Rogers said that the committee of last year had made a call on the Secretary of the Navy requesting him to cause observations to be made in relation to certain points in Hydrography, Meteorology, Natural History, &c. &c. Now, sir, we propose to send a request to the Secretary of War to institute a new and separate line of inquiry on the great subject of the level of the Continent;

the observations to be made at the mean tide level; respecting the oscillations of this part of North America. The rise and fall, of a great part of the coast of Scandinavia has been observed by Swedish geologists and noted. And it is now pretty certain that no part of the earth's surface is stationary.

Prof. Silliman.—I should like to add inquiry into a subject I am ignorant of and have no means of informing myself about. It is the average elevation of continents above the level of the sea.

I. The average elevation of North America;
II. The average elevation of South America;
III. The average elevation of Europe;
IV. The average elevation of Asia;
V. The average elevation of Africa.

By the deduction of particulars from known data we can come pretty nearly to correct data.

Prof. Rogers.—Humboldt has published data about the mean level of certain lands. He gives the mean level of Asia 800 feet above the ocean; and it is astonishing how small a part the mountains have to contribute to the earth's elevation.

Silliman.—What does he give, sir, as the elevation of North America?

Rogers.—Some five or six hundred feet as the average.

Silliman.—That is even within my mark; I have said less than a quarter of a mile, and then have been thought romancing; and even this may be caused by the mass of the earth swelling by expansion.

Rogers.—By probably the general wavering of the earth's crust, Sweden rises several feet a century; and it would not take long to bring all Europe to its present level.

Prof. Loomis.—The pilots of Maine say that the tide is sinking every year; and that certain rocks on Maine shore are now visible, *over which* they could formerly conduct vessels at any tide. It is so especially at the mouth of the Kennebec.

Prof. Rogers observed that the north shores appeared to be going down and the south coming up; else why were all our south shores sandy flats, and New-England a rock-bound coast from Cape Cod to its north-east border. The middle and southern States—all the sea islands from Long-Island to the Florida Keys, indicate a general rise of the land south. *This Continent is swinging on a hinge or great pivot*, the point of which is at about the Bay of Massachusetts. The south part is rising and the north going down; not exactly in their moral or intellectual qualifications, unfortunately, as recent changes indicate. (Laughter.)

Prof. Silliman.—Where did you put your pivot sir? (Laughter.)

Prof. Rogers.—About Cape Cod I think it is fixed. (More laughter.

Prof Silliman then observed that the change of level in New-Haven harbor must be owing to other causes than merely the setting up of silt, as is generally supposed.

Mr. Redfield pointed out on the new chart of New-York bay where a few years since there were 40 feet of water, it is now solid shore. This was done by the continual abrasion of the ocean against the bolder shore of Jersey south of Sandy Hook; this was the principal source of supply for making sand bars every where, and not what was brought down by rivers from up the country.

President Dewey said he once heard as a reason for the great rise of the tides in the Bay of Fundy, that it had a moveable bottom (laughter) which sank down very low and in came the tide; then the bottom swelled up again and out went the tide. He was glad to find that we were turning round properly on a pivot.

The Convention then adjourned till to-morrow at 9.

[The subject of a change of level in the northern parts of New-York and New-England engaged the attention of the Editor many years since. In 1834-5, on his way to Nova Scotia, he observed that the coast in that vicinity was skirted by a deposit of marly clay in which the remains of moluscous animals of species now living in the water were very abundant. The elevation of the formation was stated at the time at forty feet, and the inquiry was raised whether this single formation did not indicate a comparatively recent elevation of the coast; it was so regarded at the time, and numerous facts which have since fallen under his observation have confirmed the opinion thus early expressed; which so far as geologists had then expressed their views, was certainly among the first. Men often express opinions upon a subject, long before they are in possession of facts which bear at all upon the subject. In the existence, however, of this deposit so much above the adjacent water, we have a fact clearly indicating a change of level at this place. It of course required an extension of the same fact in order to establish a general rise of the coast. Since the time referred to, many localities have been discovered of precisely the same character, as the tertiary of the St. Lawrence basin, which has been fully described in the reports of the 2d geological district of New-York. See American Journal of Science and Arts, No. 2, Vol. XXX., the report of 1837. Also final report of the geology of the 2d district of New-York.]—Ed.

SECOND DAY.

The President, Dewey, took the chair, and among the distinguished savans present (new arrivals) were President Day, Prof. Hitchcock, Prof. Bailey, of West Point, Prof. Coffin, of Norwalk, Ct., Dr. S. Bacon of Boston, Dr. Jackson of Boston.

Prof. Rogers, from the committee on business, said they had prepared a programme; the report was read of the committee appointed last year, on addressing a memorial to the Secretary of the Navy on the subject of the Gulf Stream. Lieut. Maury is chairman of the committee; the report is but provisional, and the committee desire to be sanctioned in a continuance of functions. It contained a copy of instructions to officers of the navy for making observations on the Gulf Stream, and a letter of the Secretary of the Navy, who wishes these instructions to be given to the officers of the Columbus now going out, in order to further the views of the Association in a thoroughly analytical examination of the Gulf Stream. The nature of the instructions may be gleaned from the following subjects to be inquired into:

Course and set of the stream.
Temperature of the water at different depths.
Depth of current and velocity at different depths.
Fluctuations of the current in gales of wind.
Character of the bottom in various places.
The difference between the edges and centre of the stream.
The limit, force and set of different currents.
The line of deep-sea soundings to be noted between the coast and Gulf Stream all along the coast; which would be of great value to vessels approaching the coast in bad weather.
The nature, extent and course of the Gulf Weed.
The places, appearances, &c., of any drift wood; some of which drifts from the Mississippi and is lodged on the Tortugas.
Icebergs and the currents around them.
The strength and durability of storms.
Meridian altitudes of the stars.
Sights on the instruments to take P. M. as well as A. M. observations.
Streaks of warm and cold water; their limits and breadth.
Formation of shoals and spits of land.
Fishes of various Islands, and what are preferred for food.
Volcanic regions, their altitude, appearance, &c. &c.
Geological structure of all islands.
Rise and fall of tides at all places.
Corals, mollusca, fishes, &c., at all places.
And for all this an abstract log is to be kept.

The committee also say that the prismatic azimuth compass is to be employed mounted on its tripod and placed abaft the binnacle, and to be placed as free from the influence of the guns and all other ferruginous matter as possible; and the difference between it and the ordinary compass, to be also carefully noted. The entire absence of coraline in the Gulf, which is always found in similar latitudes in Asia, &c. is to be carefully noted; as this is supposed to indicate counter currents of hot and cold water, at different depths and on different sides; for this it is proposed to use Sykes's thermometer. These observations it is also believed will also bring out proof of the existence of a deep shoal one hundred and twenty miles south of St. George's Banks. The coast of Georgia shows that the Gulf Stream on quitting the coast of Florida does not run due north as before, but to the northward and westward; and this will explain the apparent problem why the Gulf Stream runs with greater velocity off Cape Fear and Hatteras. Careful observations are also to be made in relation to a stream of warm water setting from the coast of China to the northwest coast of America; and it is expected to find currents well marked running through Bhering's straits along the north coast of America into Baffin's Bay, and along the coast of northern Asia.

The committee add that our ships have all the necessary instruments except Sykes's thermometer; and the skill of American officers is so proverbial that the body of information thus collected would be invaluable.

On motion, the committee was continued *ad infinitum*, and the report accepted; report to be matured by the committee and Mr. Redfield, and transmitted to Washington to the Secretary of the Navy to be sent out in our ships of war to China.

No remarks were elicited by this report.

Papers on oceanic drift were called for. None came at the call.

The President called for the paper by Dr. Reed, on a chain of erratic serpentine rocks in Berkshire. He stated that the chain begins at Canaan Hill, Columbia Co., with the talcose slate. The hills are crowned by slate or greywacke, but melted so as to lose their slaty character. These are carried down the hills, and over hills; and we go down the valley between the Canaan and Richmond Hills, and there meet immense masses of these rocks—boulders—close by the State line. We go on through Richmond valley, and find 50 blocks, twenty thousand cubic feet in size, above ground; go on a little south, cross Lenox mountain into another valley, and there meet more boulders; through Stockbridge, east of Lenox mountain, and meet them again, all of the same geological character. Within about two hundred rods of Canaan, slate comes to the surface; and hence proceeds another chain parallel to the first—not a specimen in the valley beneath, but many south of the southern range. The metamorphic rock crowns the summit of all. This is an intermediate range between the talcose slate of the Taconic range, and the greywacke west of the Hudson. The only rock in situ in Richmond county is lime. These boulders have no scratches; their angles are perfect; they have been brought by water, and "this side up with care," seems to have been marked on them, and attended to; edges and angles distinct beyond belief. The range is thirty miles long, and only twenty rods wide. The hill crossed by the boulders is one hundred feet higher than Canaan hill, the starting point. They form an unbroken chain of rocks; the largest and most numerous of them are on the eastern side of the hills they cross; a few are on the western side.

Prof. Hitchcock said it could not be accounted for on any known theory of drift how these boulders were placed where they were. It was remarkable to see this chain of boulders for a few rods wide and miles in length, like the grading of a railroad—carried over the hills in an oblique direction—an unbroken chain. We can see the outline very clear. Edges and angles, sharp and unbroken; it goes straight to a certain point for twenty miles, and then turns at a sharp angle of twenty-five degrees. What iceberg could have carried them all to that spot—some half as large as this room? How could it detach them from the parent rock? How could water carry them in a bee line in this way, and carry them oliquely over these hills seven hundred feet high? It was answered by some, supposing the ice to freeze round an island—or top of mountain—and then immense earthquake waves come and rock them off, and these boulders thus dropped by the waves.

Dr. Jackson supposed it owing to the existence of ancient lakes, and their freezing; the ice and water brought these boulders left them on the shores of the lakes. We see this going on in Lake Superior now—every kind of boulder of the upper country is found scattered around the Sault St. Marie—or the outlet of the lake.

Prof. Dewey observed that Prof. Hitchcock had shown that icebergs, &c., had carried large blocks of greywacke of Catskill over hills twelve hundred feet high into the Housatonic valley.

Dr. Barrett said that there were enormous masses of dirty yellow quartz lying in Middletown, rounded, oval, like an egg, and flat like a lapstone. One in front of a Mr. Bacon's house, from its size and shape, was called Bacon's pudding; these were lying several feet above the level of the valley of the Connecticut; had the land risen on which they lay, or had the Connecticut river fallen? Had we any means of knowing what was the height of the Connecticut four thousand years ago? Now the Nile, five hundred miles above its mouth, at Phile, is twenty-four feet lower than it was four thousand years ago.

Prof. Hithcock said that the terrace lines along the valley of the Connecticut, alone show that the river was once at those heights. We have no means of gauging it within any historic record.

Dr. Jackson said that the ancient pot holes eleven feet deep in the hardest granite on the tops of mountains dividing Merrimack and Connecticut were full of pebbles, and show that the Connecticut and Merrimac were once connected. Eleven hundred feet is the height of the mountain on which they are found.

Prof. Silliman spoke of the remarkable pot holes on the Franconia mountain, twenty by fifteen feet in size and fifteen feet deep—water flowing through there now—most beautiful example of the connections of different streams; no workman could carve it out so skilfully. It should be visited by all scientific persons.

Dr. Jackson said, that long before *the present continents were elevated above the ocean*, water must have passed through this mountain gorge between the Merrimack and the Connecticut rivers.

Prof. Silliman said that no doubt the true mode of transport was ice and water; but their great power was much underrated. Lieut. Ringgold, of the Expedition, said he coasted along one iceberg over seventy miles in length—a mere stranded iceberg. Here, then, was a mode of transport for the largest blocks we ever find; the blocks once torn off from the parent rock, and frozen in, then the ice melts, and the boulders drop down in line for forty, fifty, or sixty miles.

Mr. Hays, of the Exploring Expedition, believed the great transporting agents to be the small icebergs of four or five miles long, which in the South Seas are continually detaching themselves and pieces of rock along, but never carry the rock above two miles from the source, and thus a line of boulders might be distributed like those lines of boulders spoken of by Dr. Reed.

Dr. Reed said the angle in the line of boulders in Berkshire county was a direct angle of twenty-five degrees and not a curve.

Prof. Hitchcock said that these remarks threw more light on the great moving power of these boulders than he had ever met with before; but the chain was so narrow and regular.

Dr. Reed said the width of the chain was about 15 feet only, and never more than 30 feet wide. As to icebergs breaking off the top of these rocks, why did they not break off the tops of the hills close by, only a few feet lower, where the slate comes to the surface?

Dr. Jackson alluded to the carrying of the large copper rock from Isle Royal, Lake Superior, to the Ontonagan river on a raft of ice.

Prof. Rogers said that before they could establish such theories, they must first prove or presuppose the permanent submersion of the present Continents below the level of the sea; and he challenged proof of this from any one, as he had often done before; if such had been the case, there would have been great ocean tide marks to show when and where this Continent was submerged. But in the midland valleys of the American States there was no marine deposit in proof of this; no marine clays or marine shells in the valleys of the Ohio, or any of those regions. There was proof that an arm of the sea ran round at one time from the St. Lawrence down through Lake Champlain, making an island of

New-England; and also proof that an arm of the sea once ran from Lake Ontario to the Hudson river, making an island of the upper part of the State of New-York; but there was no proof that this whole Continent had been submerged, as the gentleman insisted on presupposing. He must insist on accounting for it in another way; by volcanic force acting on the great oceans of the north. This would produce all the wonderful results we are daily otherwise astonished at. Bodies of water hurled along with tremendous velocity will carry large masses of stone suspended for a long distance. From the mouth of the river Amazon large bodies of stone are carried out by the velocity of the water a great way to sea before they sink. And in this way one force from the north meeting an opposing force, it is very natural that these angles should be thus formed, as described by Dr. Reed of the chain of serpentine boulders in the paper read to them this morning. A sudden irruption of an Arctic Sea, upheaved by a volcano, would be equal to all the phenomena of this character. But he was surprised that the subject of waves of translation was not considered in this relation. Waves of translation are caused by a movement of the whole body of the sea from its surface to the bed of the sea. Who can count on the immense force of such a moving power? The great tide wave goes round the earth twice in 24 hours. But the velocity of sea waves, engendered by earthquakes, has a velocity of 30 miles a minute—twice the velocity of sound. *The earthquake of Lisbon threw a succession of* 36 *enormous waves across the Atlantic to the shores of Antigua in* 10 *hours.* Ten successive shocks at exact intervals of 35 minutes. We must look for explanation to a great volcano bursting out in the Arctic Sea, throwing waves across the southern Continents, and these are still farther carried forward by the successive rocking of the great crust of the earth; in their course ripping off all the projecting crests of the highest hills and leaving them where we find them; and simply accounting for all the phenomena we find on the earth's surface.

Prof. Rogers continued in a most eloquent manner to combat the theories of the dynamic force of icebergs, &c., as moving causes of these deposits, and to prove by actual data the precise velocity of certain seas, and streams, and the large number of pounds weight they would carry to given distances.

Prof. Silliman said that the Catskill mountains and hills of Ohio were formed under water—there was no necessity for sinking the mountains—they were under water before—they were upheaved from beneath the water and presenting their salient points; getting encrusted with ice; then suppose that Prof. Rogers' great power was set in motion, breaking off these icebergs and whirling them round and round; these angles might thus be formed; and thus all these theories are easily reconcilable with each other.

Mr. Whelpley said—It was necessary to account for the trenching out of the valleys in addition to the other matters alluded to, and explained the geological phenomena connected with the breaking of the dam of Mill Rock, near New-Haven, the trap rocks, and other places in the vicinity; and contended, very modestly, that the trenching out of the valleys, the deposition of ranges of boulders, the formation of the terraces of the river valleys, could all be accounted for on the supposition that the subsiding and raising of the earth's surface was gradual.

Prof. Hitchcock moved to lay the subject on the table; it had generally formed the dessert of our entertainment, and now it bid fair to occupy the place of their dinner. (Laughter.) He hoped, however, to hear of it again; he believed the understanding was that gentlemen should be allowed to mix their ice and water in quantities to suit themselves. (Laughter.)

The subject was then laid on the table.

Invitations were then tendered and accepted for all present, *including the reporters*, to go and take supper with Prof. Shepard, and examine his beautiful collection of minerals. But the reporters had so much work to do that they could not avail themselves of the Professor's very appropriate courtesy.

Prof. Silliman then said that he would be on the bridge to-morrow morning at 8 o'clock, ready to conduct any gentleman to the *top of the East Rock*, so as to get a good view of the curious formation of the surrounding country.

An unfinished paper on the fossil fish of the United States was read by Mr. Redfield for his son, and the meeting adjourned.

AFTERNOON SESSION.

The General Committee were then appointed of the following persons:

Prof. Dewey,
Dr. Jackson,
Prof. Silliman,
Dr. J. C. Booth,
E. C. Herrick,
Mr. Redfield,
B. Silliman, Jr.
Dr. Binney,
Prof. Hitchcock,
John L. Hayes,
Prof. Rogers,
Dr. Dana.

Mr. E. C. Herrick was appointed Treasurer.

Prof. Hitchcock then made some remarks about the Geology of Western Asia. He had received one hundred specimens from Mount Olympus, some of which—calcareous spar—were very curious; he had three hundred specimens of a series of rocks between Trebizond and Ooroomia he would write about hereafter. He was curious to get a bottle of the water of the Caspian sea; and this spring he received a bottle of it through the British consul at Teheran, which must have come at least twelve hundred miles on horseback. The consul got several bottles of the water from the Russian Admiral commanding the squadron in the Bay of Astrabad; he made one of his captains go and fill the bottle far out in the Caspian Sea. An analysis of this water gave in 1000 grains 13.2 grains of solid contents; of free carbonic acid .24 equal to .5 of a cubic inch; and there is a large quantity of sulphuretted hydrogen in it—.67 of a grain; and this is a much larger proportion than we generally find in sulphur springs. The result I give thus:

	Grains.
Sulphuric acid,	2.3
Chlorine,	4.9
Lime,	1.4
Sodium,	2.5
Magnesia,	1.3
Carbonates lime and magnesia,	0.4
Gypsum and do. do.	0.4

Or thrown into the form of salts thus:

Sulphate of magnesia,	4.36
Chloride sodium,	5.17
Carbonates of lime and magnesia in solution,	0.46
Chloride calcium,	2.08
Sulphate lime,	0.44
Sulphuretted hydrogen,	0.71

This water contained no iodine and no bromine; its taste is peculiar; and it is a weak saline.

A bottle of Caspian water from close to the shore only gave 8 grains of solid matter in 1000; and nearly one of sulphuretted hydrogen—a very large proportion of the latter indeed, owing to the decomposition of the sulphates by organic matter.

The analysis of the ocean water on the eastern coast of Africa also shows large quantities of sulphuretted hydrogen, produced by the decomposition of organic matter at the mouths of rivers on the coast. This can be seen by reference to Prof. Daniel's analysis. And this sulphuretted hydrogen, from this organic matter, is the cause of the terrible fevers on the coast of Africa, where the malaria is said to prevail, and in all hot climates.

Prof. H. also said that Mr. Perkins had sent home a very curious account of a salt pond in Persia, the water of which was five feet deep, and the salt at the bottom five feet thick; the water was separated from a large salt lake by a small sand bar; in high winds the lake water was washed over the bar into the pond, and thence was evaporated and salt made by the hand of nature. He also sent home an account of a curious cave near Ooromania, out of which flows a stream of carbonic acid gas similar to that at the grotto Del Cano near Naples.

Dr. Booth said, that he formerly analyzed the Croton and Schuylkill waters; the former had five grains of solids, and the latter four, to the gallon; now, in the absence of disturbing causes, the Croton only contained less than four grains to the gallon, and was purer than the Schuylkill; but the purest water he ever analyzed, was that of the creek at Washington city. The water of the Yellow Springs in Pennsylvania contained silica in solution; and he thought sufficient attention was not paid to the presence of silica, as he believed it acted a very important part in mineral waters, and he believed it to be soluble in pure water.

Dr. Jackson thought the solution of silica was owing to the presence of crenic acid; you cannot separate them.

Dr. Barrett considered that the presence of shells had a great effect in purifying water.

Dr. Jackson agreed with this view, and mentioned as an illustration the lime pond in New-Hampshire; where large quantities of organic matter were converted into food by shell fish; they had concentrated the lime in the water—the organic matter into a shell; and formed a large deposit of shell marl.

The Convention then adjourned.

EVENING SESSION.

The chairman announced the business to be:

1. Foot tracks in the sandstone of the Connecticut valley, by Dr. Barrett.
2. Classification of the animals that made the tracks, by Prof. Hitchcock.
3. New fossil foot tracks in the new red sandstone of Pennsylvania, by Dr. Dean.
4. Evidences of the congelation of the new red sandstone, by Dr. Barrett. (This paper was deferred.)

Dr. Barrett said that it was in 1826 he first found tracks of birds in the red sandstone of Connecticut, and told Prof. Silliman of it. He now would show the track of a new animal, a right and left foot; the centre toe is a little worn; I called it a canthodactylus; the treading was quite heavy. The next track is that of an animal with a tread as heavy as the hippopotamus; the foot is 8 inches in diameter; part of the second foot is broken. A third specimen comes near the elk or some of the ox tribe. It is evidently that of a hoofed animal. It is in pale grey soft sandstone; and the track is filled with blue grit. It is in a slab of pavement in the streets of Middletown. The stone is 21 inches wide, and 3 feet 5 inches long; the tracks are in the middle of the stone; the foot marks are 13 inches wide and about the same length; also the same distance to the front of the next step. All the slabs with tracks came from a quarry one mile west of Middletown, near the comb factory. They are rare in the Portland quarry; the one most common is about 5 inches long, and is unlike any before known. He thinks the large foot track to be the same animal that Dr. King described, but his animal's feet were only half the size. He also found foot tracks of birds of a gigantic size, 14 inches long and 11 inches wide. He also saw tracks of a pair of feet that looked very much like the human foot, but not quite so long; he showed a drawing resembling two clubbed feet. He found one slab 14 feet long that had the tracks of at least a dozen different animals crossing it. He felt certain that if ever that aforesaid quarry should be re-opened it would be found rich in foot tracks.

Dr. Barrett exhibited very excellent drawings of all these foot tracks, which excited great curiosity among the audience.

Prof. Hitchcock said that formerly he gave names to the tracks found in the red sandstone instead of the animals that made them; because, except the tracks, there is no relic left of those animals worth mentioning. But at the suggestion of Mr. Dana he had made out a classification and nomenclature of all the animals whose tracks had been found in the red sandstone of the Connecticut valley. These animals were chiefly birds of a very low order of organization. He then read off his list of names given to these birds. The species were 35; and the genera were 20; he tried to make the number smaller, but could not without classing together species that are more unlike than what we find in living animals. He had measured the feet in every possible way, with care, the same as phrenologists measure the head; and done all in his power to classify them correctly.

Prof. Silliman read a letter from Dr. Dean of Amherst, who has found fossil foot marks in a new location near Amherst. He began by stating the incredulity with which the announcement of the discovery of these foot marks was received. Since then all the geologists of England have given in their adhesion to the subject. Since then enormous birds (fossil) have been discovered in the alluvial deposit of New-Zealand, and sent to England, of a larger size than any found and claimed by Prof. Hitchcock. Recently specimens of bird tracks have been found near Greenville in Penn.; also some like terrestrial animals; air-breathing, warm blooded animals, 5 toed and long foot; also some of the large hand-footed tribe—like thehuman hand—now by Dr. Owen proved to have belonged to a large Batracian animal, one of the *frog tribe*—a frog as large as a bull, or an elephant—*one of the great croakers of his day!* There are numerous tracks of these frogs where they kept dancing about on the rocks, and these are many hundred feet below the new red sandstone, and they are below the coal. These convince me that whilst the earth was being fitted to pass into its present state, after the era in which it was occupied entirely by marine animals; then came the ornithold era, then a reptilic era, then the interesting series connected with the coal beds, then the enormous Saurian reptiles through the great series of the Lias and the Oolites up to the chalk; passing through that peculiar formation we come to the period of terrestrial animals and to the era of the present forests and that of man. Dr. Dean states that he has found 10 or 12 specimens of these five toed foot tracks, with the bunch part, like the ball of the hand, and behind each track there is an oblong, irregular *depression*, which depressions are arranged in the sandstone opposite to each other as the tracks are; making it appear that the animal's hind *feet* did not touch the ground when he was too deep, but that he sat on his haunches, and the nature of the depression makes it seem that one part of the hind leg was evidently folded under the other. These marks were very curious, and opened a new field for inquiry. Numerous bird tracks were also found along with the tracks of quadrupeds; the papillæ of the integuments are perfectly preserved.

Prof. Silliman then exhibited Dr. Owen's fac simile plates of the fossil birds found at New-Zealand, the thigh bone reaching from a man's knee to his shoulder.

Prof. Rogers then exhibited a map of the coal beds and intermediate layers of Pennsylvania, where Dr. King found the fossil foot marks. He described the great Pittsburg coal basin as being a seam of coal 10 to 14 feet thick, and occupying an area of 14,000 square miles—twice as large as Massachusetts—and of a very pure coal. The basin or seam in which the foot tracks were found by Dr. King stretches south to Alabama, west to Ohio, and north to Lake Erie; and occupies an area of 63,000 square miles—larger than all England and Scotland. It is 150 feet below the seam of Pittsburg coal—there being eight good working seams of coal in Pennsylvania below that of the Pittsburg; and only one good working seam above it.

Prof. Rogers also said that all these foot tracks found in this region except one, were said by Dr. King to be in relief; and if so they could not belong to any animal. He believed them to be made by reptiles; it was was the place to look for Batracian animals; he did not expect to find the tracks of winged, air-breathing animals; and if they proved to be so, it would be indeed a discovery in the history of the populating of our globe that would possess the highest interest. The subject should be inquired into at once.

Mr. Haldeman stated that one of the New-York State Geologists had suggested that these apparent foot tracks in the carboniferous series might be marine plants.

Prof. Silliman said this idea was abandoned soon after it was first promulgated.

THIRD DAY.

Dr. Barrett read a brief paper on the evidences of congelation in the new red sandstone of Middletown and Chatham. He had long seen evidences of solar heat exhibited in the red sandstone—by the cracks showing the baking process, and the temperature of the earth at that time; and he had looked a long time for evidences of cold or freezing. He had at last found evidences of triangles and rhomboids, &c.; some five or six inches and more on the sides; and thus affording a very interesting evidence of the various degrees of temperature at the time those birds lived and walked over the earth, at the time those tracks were made that were alluded to yesterday. This fine old meteorological record of the weather in those days, (being so much more ancient and interesting than the records of ancient Egypt,) were thus stereotyped on the spot, and sealed up, to be opened and exhibited to us thousands of ages afterwards, as a true record of that part of the earth's history. He had some difficulty in regard to the large size of the rhombs and triangles he found in the sandstone; but after much examination he found in 1841, after a frost, specimens of similar triangles and rhombs, formed by the crystalization of the water during the night; some of the triangles were twelve inches in length; some of the rhombs were eighteen inches long; and what was remarkable, these crystals of ice had pressed upon the thin crust of mud beneath, and made indentations similar precisely to the evidences of congelation he had found in the red sandstone; and while making his observations, animals came along and actually walked over the ice, pressing it down on the mud beneath—breaking through and making tracks in the mud precisely similar in manner, &c., to the evidences of bird tracks found by Prof. Hitchcock in the red sandstone of the Connecticut valley, in such beautiful perfection. Dr. Barrett also said that he had carefully examined the sandstone used in the new library building of Yale College, and he can show in the cracks thereof evidences of the solar heat that produced them; some of these had been partially filled up by sand and mud. He could also show rain drops of the old world in this sandstone—also the ripple marks of waves, and one triangular crystal of sandstone. He could show where there were marks of the strong waves and weak waves—wshoing very clearly that in that terribly old world, water was subject to the same laws that it is now.

[The phenomenon referred to by Dr. Barrett furnishes no evidence of congelation—it is merely the effect of drying, or crystalization. All rocks exhibit similar conditions.]—*Ed.*

Mr. Silliman, jr., said that he thought the appearances spoken of by Dr. Barrett were attributable to the rhomboidhedral cleavage so often witnessed in the red sandstone, which had frequently been regarded as a species of semi-crystalization—little else than the jointed structure peculiar to the new red sandstone.

Prof. Johnson said that the remarks alluded to by Dr. Barrett were very different from the jointed structure of the sandstone, so peculiarly noticeable in the pavements of the streets of Hartford.

Prof. Rogers said it was highly important that the angles of the rhombs, &c., mentioned by Dr. Barrett, should be measured. He conceived that the temperature of the earth, at the time of the formation of the sandstone, was far above any possible point of the crystalization of water.

Dr. Barrett said that he did not refer to structure at all, but to indentations in the mud.

Prof. Rogers said that, still, there was a kind of indentation that belonged to structure.

Dr. Barrett said he was satisfied that, by the features he had that day explained, he could readily determine the temperature of the earth at that "very olden time," within about twenty degrees.

Prof. Silliman said that, if they went on with this subject, they would freeze up all their time. He moved to drop the subject for the present time.

A very interesting and curious paper was then read by Mr. Dana, on the minerals of the trap rock series.

Dr. Jackson followed with very able and unusually clear remarks, on the subject of the minerals of trap *dykes*. He said that wherever two rocks come together, one of igneous and the other of aqueous origin, there is always a chemical action between them. Not so, or scarcely to any extent, where a rock of igneous origin goes through a rock like limestone, which though of aqueous origin, has undergone chemical action and crystalized. For example, when trap dyke goes through lime rocks, the rocks unite without any commotion, and a pure silicate of lime is formed. So when the trap passes through clay rocks or clay slate, the slate is baked hard, and jasper and jasper minerals are formed. So when the trap passes through granite, no amygdyloid is formed. But when the trap passes through sandstone rock, you then see that there has been a violent tumult—considerable effervescence, and either amygdyloid is formed, or a trap tufa which is sometimes porous and cellular, as the scoria or lava of the volcanic regions of Etna, &c. Again, where the trap rock runs through granite, we find sulphurets of iron formed; where the trap goes through clay slate, we find the same minerals resulting: when the trap goes through limestone, we find galena and the ores of zinc; and where the trap goes through the red sandstone, we find copper produced. This is peculiarly the case in Nova Scotia; no lead is found in the trap there, but pure copper; the sulphurets of copper lay in the sandstone; heat was required to expel the sulphur; nature did this when forcing the heated trap rocks through the sandstone, and the pure copper is thus reduced from the ore. We see abundant evidence of this also, in the copper of Lake Superior, where the same process has been going on. [Specimens were here shown.] Abundance of sulphurets of copper are found in the red sandstone, filling fossil plants.

In answer to questions, Dr. Jackson stated that the base of the trap rock agreeing with the sandstone, prevented any great disturbance when the former passed through the latter, whilst the fineness of the sandstone accounts for the cellular nature of what trifling portions of amygdyloid is found at the point of contact. He fully agreed with Mr. Dana, that the agency of hot water was employed by nature to fill up the cavities of trap rock minerals with crystals by deposition. He also instanced the beautiful arrangement by which when trap rock passed through gradual limestone, and the metalic oxides were present, we have all the varieties of cinnamon and other garnets, according to the modifications of the oxides; by the fusion of that limestone in contact with its walls. And he instanced the fact that wherever these cinnamon garnets, &c., are found in the loose soil, it is an evidence that limestone is close by, and is thus a valuable guide. Dr. Jackson placed the rocks in the following order of age. The oldest was the porphyry; next the porphyritic traps, then the blue trap, then the brown trap, then the bastard containing olivine, &c. And it is curious to see the many different points of the compass to which these different series bear; the porphyry runs from nearly south to north; the porphyritic trap, from S. W. to N. E.; the blue trap, from W. S. W. to E. N. E.; the brown trap, nearly east and west; and the basalt from E. S. E. to W. N. W.; thus going all round the compass; and of course the various different series of trap rocks must frequently intersect and cut through each other, and at Bald Head, York; and at Rye, near Portsmouth, N. H., we have very fine specimens of these interesting trap dykes. Dr. Jackson also spoke of the fact, usually overlooked, that sea water from all parts of the earth contains phosphates. Every specimen of water brought home by the exploring expedition, gave this result. He had analyzed the hot waters of the Geysers, and found no boracic acid therein; the silica there was held in solution by caustic soda; on exposure to the air, the soda, absorbing carbonic acid from the atmosphere, becomes carbonate of soda, and the silica falls down in a solid mass.

Mr. Dana had previously related the singular fact, that silica remains in a semi-fluid state long after deposition, and is thus easily permeable by solution; oil and water it was well known would filter through chalcedony, and it was in this way that quartz and chalcedonic geodes contained in their centre other and very different mineral substances in a beautiful crystalized state.

Prof. Silliman produced a fine specimen of native copper found near Wallingford, Conn., where the trap had passed through the red sandstone, and a mass of one hundred pounds weight had been thus found.

Mr. ——— exemplified the agency of hot water in producing great mineral changes, and instanced the upheaving of a mass of trachite from beneath the sea at Oonolaska, where the sea was made warm for three miles around it. Again, at Banda, a large rock of trachite was forced up through the sea gradually, and heated the water for a great distance, and the rock remained hot for a year afterwards. Also, the similar case at Sabrina, and at Deception Island in the South Shetlands, where there was no eruption, a mass rose up in three or four years, and the water was hot for miles around.

Here Prof. Shepard asked Mr. Dana if in connection with the order of super-position he had ever seen quartz upon datholite ? Mr. Dana said he had seen phrenite upon datholite, but not quartz; and also quartz upon zeolite.

Prof. Shepard fully agreed in the great agency of hot water in forming amygdyloid minerals in the trapian rocks.

A very brief paper was then read by Mr. ———, on the Geology of the Island of Jamaica, and one by Dr. Hitchcock, on the polarity of common trap and boulders; and the meeting adjourned.

AFTERNOON SESSION.

A very able paper was read by Mr. Dewey, on the Gypsum of New-York.

The rest of the afternoon was spent in a desultory but very interesting manner, by conversations between the members, on various scientific subjects.

Mr. Haldeman of Philadelphia introduced a new and important chromatic wheel, and explained the same.

It was proposed to appoint committees of members who live near the mouths of all large rivers going into the sea, to note the amount of sediment annually carried by the rivers into the sea.

It was also proposed to memorialize the Secretary of War to cause general observations to be made on the change of the level of the coast; also observations on mean tide level.

A new form of improved mountain barometer was introduced by Prof. Jackson or Johnson, and proper stress laid on the necessity of improving the barometer, on account of its great superiority in determining the height of mountains.

The meeting then adjourned, and the members went to Prof. Silliman's residence to partake of his hospitality, where they enjoyed a most intellectual treat.

FOURTH DAY.

After the previous day's minutes had been read and corrected, the names of several new members were presented for approval, as was the case yesterday.

Prof. C. N. Shepard then gave a very interesting account of a new locality of meteoric iron, at the head of St. Augustine Bay, on the southwest coast of Madagascar. The information came from Lt. H. C. Flagg, who touched at a town at the head of that bay in the John Adams, U. S. ship of war. The people are in the wildest possible state of savages: their hair is long and black; features Caucasian; clothes of not much account; and their only weapons the spear and fish hook. When the John Adams' people offered these savages some American iron in exchange for provisions, &c., they rejected it with disdain, saying that they had native iron in their own island of a far superior quality, and pointed to some elevated land about six or eight miles in the interior, where they said they found large quantities of pure malleable iron, and many large boulders of it—one boulder being at least sixteen feet in diameter. This iron they skilfully worked up into spear-heads of a very destructive and superior character, and fish-hooks; their great skill in working this iron they obtained from the buccaneers, who frequented the island very often after the capture of Mozambique by Vasco de Gama. Prof. Shepard said he had analysed a part of one of these spear-heads, and found it to be true meteoric iron; it contained nickel. Its specific gravity was 7.8, and its analysis gave—

Iron,	96.66
Nickel and traces of cobalt,	3.34

and the structure was different from that of any pure iron that we know of. The largest specimen of meteoric iron previously known, was a piece of about 30,000 pounds, in South America. This piece found in Madagascar, if correctly described, must be much the largest. Certainly the deposit in Madagascar is a very extraordinary one. It is certain that this iron came from Heaven, although it has since been put to very base purposes; for just before the ship John Adams reached Madagascar, the crew of a British merchant vessel were murdered by these very natives; and the spear in the room probably drank the blood of a son of "per fidious Albion."

THE SEA HARE.

Prof. Shepard then exhibited a very fine specimen of a curious and rare animal called the sea hare by the ancients—*Lepus Marinus*. The animal is of an oval form, with peculiarly shaped tentacula; when the animal is moving in the water, its tentacles look like the ears of the hare in running. Pliny frequently speaks of the *Lepus Marinus*, although he never described the animal. This little animal was supposed to be most deadly poisonous, and whoever touched the peculiar blue liquid which is emitted from its body, was considered by the ancient Romans as sure to die within as many days as there are days in the life of the animal.

Prof. Silliman.—How did they get at the number of days in the life of the animal, sir? (Laughter.)

Prof. Shepard.—That was determined, sir, by the number of days at the end of which the person died. (Increased laughter.) Nero was supposed to have been poisoned by it; Domitian, it was said, poisoned his brother with this fluid; and it was commonly believed that this fluid was one of the most powerfully concentrated poisons in the world. Apuleius was once arraigned on a charge of poisoning, merely because it was proved that he once employed a person to catch one of these little sea hares. Whereas, it is now known to be one of the most harmless and inoffensive little animals in the world. It is a true moluscula; its class is the gasteropoda of Cuvier, and of the order techtebranchiata; *and this is the only species of that order ever found in our waters.* I obtained it on the shore at Charleston, S. C. It could scarcely move when I took it from the water. As soon as I placed it in a white pocket handkerchief, it drenched the handkerchief with a beautiful carmine or deep purple fluid, as though it had been drenched with blood; this appears to be its only mode of defence, and is discharged from an appendage close to the gills, through millions of pores, there being no general outlet; secreted like saliva; it has no ink bag, like the cuttle fish, but like it, can discolor the waters round it; it will color a hogshead of water as dark as port wine. It lives along the shore; feeds on fuci; the body is five inches long, and the foot is five and a half inches long. It could not come from the West Indies; it is a slow traveller and has many enemies. A different species is found in America; others at Marseilles and Barbary.

GOLD AND DIAMONDS OF BRAZIL.

Prof. Shepard then made a few very interesting remarks on the elastic sandstone of the gold region. He produced a specimen from Buncombe county, N. C., which very much resembles the elastic sandstone of Brazil. In Charleston he met with a very eminent scientific man named Shreiver, of Hessia, (formerly a student of Gottingen) who had passed a year or two in Georgia, making observations, and who had several specimens of this beautiful sandstone. He had been induced to collect these from the fact that Baron Eswege had, in describing the gold and diamond regions of Brazil, shown that the elastic sandstone prevails extensively there. The fact also induced Dr. Eglehart to search carefully the Ural Mountains, and there he found this elastic sandstone in abundance. He then predicted that diamonds and platina would soon be found in those Ural Mountains, and on searching that region, both diamonds and platina were found there. This mineral was itacolemite; interlaminated with primary rocks, mica slate, and talc slate. It was 100 feet thick in Hall county, and takes a northeast and southwest course, on the east bank of the Chattahoochie, through Habersham and Raeburn counties. At one locality in Hall county, they actually found a diamond at one of the gold washing deposits; it was worth about $35. Another diamond was found by a workman, which was unfortunately broken in pieces. Mr. Schreiver examined this mine after it was abandoned, and washed the sands there carefully for two weeks, but found no more diamonds. But still, said Prof. Shepard, there is not the slightest doubt but that plenty of diamonds will yet be found in those regions. This place was at Linnville Mountain, Burke county, N. C.: it is a spur which puts out from the Blue Range, near the Black Mountain; the Linnville River is on the north side of it, and the Katawba River is on the south side of it; there, and twenty-five miles off, at Broad River, there must be many valuable gold mines. From the course of the rocks, Prof. S. thought he would find it intermediate between Burke and Raeburn counties, and on examination he did find it there. By the report of the geology of South Carolina, page 17, by Dr. Tuomey, this mineral is found in Pickens county, S. C., with conglomerate talc and oxide; and at another locality forty miles east, in York county. Thus, this curious formation of elastic sandstone is very extensive in the south, and is every where connected with the auriferous or gold region. And from the analogy of this rock with those in Brazil and the Ural Mountains connected with the gold region, there is not the least doubt, but that before long we shall find in Georgia and the Carolinas a valuable diamond-bearing rock. This rock is properly of a transition character; for although there is some difficulty in classifying it, as some portions seem strongly to partake of the character of rocks of the primitive series, yet the diamond-bearing rock is undoubtedly of the transition order; it is in layers not conformable to the stratification of the country; and we must search it out, not where it is indubitably of a primary character, but where it partakes somewhat of a secondary character. In Stafford county, Conn., we have also a kind of flexible sandstone called firestone; a mica slate slightly flexible; but the talcose slate, usually found with the gold and diamond-bearing rocks, with us runs out.

Dr. Jackson asked if any platina has yet been found in the United States?

Prof. Shepard—None.

Jackson—I have seen a letter from Alexander Humboldt, in which he says that from the similarity of our gold region to that of Russia and Brazil, he has no doubt but that we shall find gold and diamonds in them.

Prof. Olmsted said that twenty years ago he saw two specimens of this flexible sandstone at a farm house in Lincoln county, Georgia, five miles south of Graham's Iron Works; this was also in the gold region. One piece was as flexible as an eel; it was six inches long and two inches diameter; it was cylindrical and shaped like an old fashioned pestle. I asked the farmer to give it to me, but he refused, and he must have had the organ of firmness largely developed, for when I asked him to sell it to me, he said he had concluded to keep it; but he consoled me with this remark, that if he could have made up his mind to part with it, he would not have charged me a cent for it. (Laughter.)

Dr. Jackson said there was a mineral very much like it that was used instead of granular quartz at the glass works in Keene, New-Hampshire. Was it possible that gold might be found in situ in that region. Native gold has been found in Vermont.

Prof. Shepard said it was doubtful if the native gold said to have been found in Vermont came from that State originally. It might have been washed to the spot.

Dr. Jackson alluded to Gen. Field's specimen, which undoubtedly was found *in situ* in New-Hampshire.

Prof. Dewey—Well, but gold has been washed out of the sand in Vermont.

Professor Shepard—Yes, sir, but it is believed the sand had first been salted with gold. (Laughter.)

Dewey—Well, I should like to know who can be salting the earth in this way.

Prof. Hall said he always looked upon the flexible sandstone to be a sedimentary rock.

Prof. Shepard—That agrees with the opinion of the French traveller. He was a little confused where to place it; but some of it was evidently a transition rock; and the diamonds and gold in Brazil are found only in sedimentary rocks.

Prof. Booth said that there was a large diamond in Philadelphia that had been found in a pudding stone with oxide of iron and manganese.

Prof. Shepard said that those found in the gang were not considered genuine.

TAKING SILICA OUT OF VEGETABLES.

Dr. Jackson then related a very interesting process he had invented of depriving vegetables of their silex. This was resorted to in order to use common reed poles to make paper and cordage, &c. He used for this the fluohydric acid.

For this purpose he used a lead cylinder full of reed poles crushed and moistened; he placed some fluor spar in a lead retort on a sand bath; he poured on the fluate of lime some sulphuric acid; this drove off the fluo-hydric acid, which, passing through the reeds in the retort, entirely deprived them of their silica, which silica was precipitated in the glass through the lead tube, in a gelatinous deposit. In this way most beautiful paper could be made of cane poles, or common reeds; as tough as bank note paper, and quite white. Fluor spar was four cents a pound. It is a good mode of analysis, also, and only occupies about five minutes. We can use straw or grass, &c., instead of poles, and we have also found that milk of lime first passed through the cylinder will take up much of the silex from *green* cane poles.

Mr. Redfield said that Gov. Reed of Bermuda had sent out to him a quantity of the fibres of the arrow root plant, after the arrow root had been pressed out of it; and that if any one wanted to make paper out of it, he should be happy to supply them with any quantity.

Dr. Jackson then introduced a specimen of Kenkrenite and one of Nepoline, found at Litchfield, Maine; the same, precisely as is found among the gold, &c. of the Ural Mountains. They are the first specimens ever found here.

Dr. Jackson then gave the result of his analysis of the Rosendale cement, and the Connecticut hydraulic lime; and stated that the best quality of these was when the oxygen of the bases was in such a proportion as to form a bi-basic compound. He added that the presence of manganese, of sulphuric acid, of potash and of soda had been too much overlooked in these compounds.

Prof. Rogers read a paper on the slaty cleavage of rocks, and a paper by Mr. Storer of Boston was read on the "Fishes of America.

The meeting then adjourned.

AFTEROON SESSION.

Prof. Coffin read a brief paper relative to the prevailing winds in North America; and pointed out the fallacy of making observations by the old mode; for example, out of twelve observations, if in four instances the wind blew from the north, in three from the south, two from the southwest, one from the west, and one from the southeast, the prevailing record would be that the wind mainly blew from the north for a given time; when in fact the prevailing winds would be from the southward. He also pointed out the error of calculating surface winds, and various other erroneous matters into which ignorant men, self-styled "wind-regulators," have fallen.

The winds follow a uniform track from a point nearly west; and then from the north, toward the Rocky Mountains. But we have a less decided law in regard to wind than nearer the equator, and get out of the influence of the trade winds. Whenever the winds are registered, the change in the barometers must also be noted. The observations at the surface of the earth are very imperfect.

Mr. Redfield said that the War Department ordered, *erroneously*, that in all observations on clouds, the course of the lower strata of cloud should be noticed. This was all wrong.

Prof. Rogers trusted that Messrs. Coffin and Redfield would prepare a digested report of the prevalent course of the winds, and the systematic currents of the earth's atmosphere, on this Continent.

Prof. Olmstead hoped this would be done; and then the term "inconstant as the winds" would become obsolete; and it would be seen that the winds obey laws as well as other bodies in nature.

Mr. Redfield hoped the inquiries and reports would be independent of each other.

Prof. Rogers said that it was well known that committees of one always worked much better than any others: but there was a way to make committees of two work twice as well as committees of one—by each making an independent report.

Mr. Redfield declined, because of other business.

Finally, Prof. Coffin was appointed to post up all the vagaries of the winds on this continent.

Prof. Bailey made some very interesting remarks on that singular plant found in mines, which glowed with a phosphorescent light, making the mines look like enchanted palaces. It is called *Rhizomorpha;* he exhibited some specimens of it, which he had found in this country, not in mines, but in between the bark of the decayed stumps of old chesnut trees. He said it would be found by search, in the stumps of any decayed trees. It looked like a lot of small dark brown strings, fibres, or tendrils of decayed plants, but when taken into a dark room, it exhibited a beautiful phosphorescent light. It appeared to do this by the absorption of oxygen and the exhalation of carbonic acid; a reverse process from the ordinary combustion of vegetables. Any person could get this plant out of the fields, and exhibit the phenomenon in his own parlor. It appeared to be phosphorescent, however, only whilst growing.

Prof. Rogers said that the phosphorescence of the glow worm was also supposed to be owing to the absorption of oxygen, and the exhalation of carbonic acid gas, a similar process to the respiration of animals.

Dr. Jackson said that common calcareous spar, when placed on a hot shovel, becomes one of the most beautifully phosphorescent substances we know of. It glowed fiercely with a golden yellow light.

Dr. Jackson then read a paper on the copper mines of Lake Superior, in which he showed that the copper ore of that region is largely mixed with silver, particularly in the valuable mine on Eagle River. In a ton of the rock ore as delivered by the miner on the bank, he found, by analysis, that there was the following value: Of silver, $87.25; copper, $42.10; total value, $129.35. So that it was more properly a silver than a copper mine. He exhibited some very fine specimens of the silver and copper obtained from that place.

The meeting then adjourned.

FIFTH DAY.

COPPER MINES OF LAKE SUPERIOR.

Prof. Jackson had said in his statement that the islands between Lake Huron and the Sault St. Marie were of the same fossiliferous character as the limestone of Niagara. At the Sault we come to the red sandstone. Here the rapids are two or three miles wide and nearly a mile long; the fall is about 18 feet; it would be very easy to make a canal round them, as the excavation for the whole mile would be in soft, grey sandstone, easily blasted, and the sides of which would form good walls for the rocks. On the flat ground between the Sault village and the Lake there is a large quantity of boulders of many tons weight; of sienite, porphyry, greenstone, trap rock, with epidote and sandstone. These have all been brought hither by drift ice; and we have abundant proof of this all along the shores of the Lake. There are two well marked old shores of the Lake. One is a gravelly beach a short distance off, and another is at the base of the hills; and there is a large bog between the two. The soil on the hills is good, and supports fine trees—rock maple, birch, larch and Norway pine. True, there is no limestone on the borders of the Lake; but there are enormous veins of calcareous spar, enough for all the purposes of fluxing the copper ore; and the old red sandstone which is found up the Lake will just do to build the smelting furnaces with. The rocks dip all round the Lake towards the water at an angle of about 18 degrees, and run N. E. and S. W. The prevailing rock in the neighborhood of the copper is coarse conglomerate, with trap dykes intersecting. The ore is a hydro-silicate of copper, and was known to the old voyagers as the green rock. Veins of black oxide of copper have been opened at Point Keweewenon that contain from 60 to 70 per cent of copper. Bluffs of conglomerate and trap dykes intersecting are found *in place* between Agate harbor and Eagle harbor, with veins of calcareous spar, interspersed with datholite and pieces of pure native copper; these have the same evidences of igneous origin as the trap rock. There is also a vein of phrenite 4 feet wide, and every crystal in which had a crystal of copper attached. In short, every vein that is found or opened in that region, (no matter what the base is) contains more or less silver. But the best mine yet found is the ore on Eagle river; the vein is from 1 to 13 feet wide, and the veins contain metallic copper and silver; amygdaloidal globules with crystals of copper and particles of silver; and frequently we saw pure copper and pure silver in the same globule. We also find leaf copper and leaf silver; and octahedral crystals of silver. (Dr. J. here exhibited fine specimens of all these minerals.) The great copper rock found on the Ontonagon river had serpentine attached to it; and the only copper we find that is mixed up with serpentine is on Isle Royal, whence that great rock must have been carried on a raft of ice and landed above the rapids, as there is no copper *in situ* within miles of where it was found. In Nova Scotia the copper that is found is just where the trap goes through the sandstone, and igneous action has probably reduced the ores to native copper. But the copper on Lake Superior, I confess, I think to have been *part of the primary copper of the globe*, (as Dr. Houghton also does,) brought up from the molten mass by the trap rocks. It is a badly wrought slag; as if old Pluto had not separated all the metal from the slag before he let the trap rock push it up for the service of man. There is one vein of copper, 11 feet wide and one mile long, that will repay all the outlay of the Company. The Cornish miners there have sunk four shafts on the banks of the river, intending to work the mine under the river. One shaft is already 60 feet, another 40, another 30 feet deep—all done by hand power. The deeper they go the richer the mineral is; and it contains about one-fourth silver. Col. Gratiot has the superintendence there. And in working one single exploration shaft at the Eagle river mine, the metallic contents brought out by hand are worth $30,000! The rock is amygdaloidal, and blasts very easily; it does not take more than twenty minutes to make a hole for a blast. There is no water in the shafts at all, although they have worked down 25 feet below the bed of the river; and instead of the water of the river troubling them, when the dam is built it will be their greatest friend. The water will raise the ore from the mine, pound it, blow the blast for the smelting furnace, and saw the wood for the buildings. The prevailing ores there are the black oxide of copper and the silicate of copper; there are no sulphurets of copper found in the whole region. One valuable large vein contains, in the clear ore, 25 per cent of copper, besides silver; and the deeper they go the better it becomes.

Prof. Dewey suggested that if that was the case universally, the best plan for speculation would be to buy *under* somebody. (Much laughter.)

Dr. Jackson warned people, however, against being too sanguine; there would be a good many poor mines opened there; and as many bad speculations as there were in the Maine timber lands. (Laughter.) The copper veins are easily found; they run south 25 degrees west, and wherever we find a ravine with the depression conformable to that line we are sure to find a vein of copper; or a wet place in a ravine where the plants grow luxuriantly, it is a proof that the vein decays faster than the enclosing rock, and that vein is copper. The best flux necessary to reduce copper ore is the calcareous spar, and that is found in great abundance there. The great question is, "Will these copper veins hold out?" In the West India copper mines the native copper changes to sulphurets as we penetrate the mine. The laws of gravity are in favor of the fact that the deeper we go the richer will be the vein. How shall we go down in the earth until we come to that spot where we can ladle out the melted copper? I forget how far Professor Rogers said that would be.

Prof. Rogers.—About ten miles! (Laughter.)

Dr. Jackson.—We have abundant proofs in our specimens that the copper and silver must have melted together; we find silver in the copper, but we never find a trace of the copper in the silver. We find also zigzag veins of silver running through the copper. Now if we try to make an amalgam of these metals, if we melt the copper and bring the silver to a contact with it, part of the silver will unite with the copper and the rest remain pure silver in mechanical contact with it; but if we melt the silver and bring the copper in contact with it they will thoroughly amalgamate. And this singular segregation we find done by nature in the copper veins of the Lake Superior region. The plan proposed for separating the copper and silver in these ores, is to make all the copper into blue vitriol, then make the silver into a chloride of silver, reduce it, and send it to the mint. The copper ore will be broken up at the mine, carefully washed and picked, and then packed up in kegs and sent down to Boston to be smelted. There is also an ore of antimonial silver found in these mines. The sandstone of this region has no copper in it; but at the point of contact with the trap rocks, there is a little native copper. The rich vein of black oxide of copper opened at Fort Wilkins is 14 feet thick, and contains 70 per cent of copper. In a ton of the rude ore, as delivered by the miner at the pit bank on Eagle river, there is the following per centage:—

Of Silver	$87 25
Of Copper	42 10
Total	$129 35

And in a ton of the ore as delivered at Boston, there is $568 worth of silver and over $200 worth of copper; so that it is more properly a silver mine than a copper mine; 17 lbs. 9 oz. of the clean metal was obtained from 50 lbs. of the ore, by careful assay; 50 lbs. of copper ore gave 11 lbs. 4 oz. in large pieces of copper and silver, besides the washings; and an assay of that yielded 662 grains of pure silver, or equal to 25.2 of silver to a ton of ore.

Dr. J. also stated his observations on temperature. On Lake Superior, in August, the air was 53.8 Faht. at noon; the water was 48.2 Faht. in lat. 47 deg. North. On Lake Huron, July 23d, the air was 66.5 Faht. noon; and the water was 68 Faht.; both observations taken while the winds were blowing pretty fresh.

Prof. Shepard expressed great doubts whether the copper region of Lake Superior would not be a failure after all. He thought it was a formation analogous to the new red sandstone of the Connecticut valley. Copper was found in numerous places along this valley, diffused through quartz and barytes spar, and entangled with trap at the contact surface of the primary and secondary rocks. It was found thus chiefly on the western frontier line of the secondary; at Rocky Hill near Hartford, and at Enfield Falls. Here was found native copper, red oxide and black oxide of copper, copper pyrites, &c.; all washed down from their original matrix into the valley, and washed into the crevices of the sandstone. He conceived this valley to have been once a lake, at the bottom of which were large masses, sheets and boulders of copper. Then came the trap dykes fusing up to the surface, and brought up the copper, through which they passed, the copper resting on both sides of the trap as at Mount Carmel. He conceived Lake Superior to have been originally a primitive formation; the new red sandstone was found on either side of the Lake; and the copper found there was swept by waters into the vertical chinks of the sandstone; then as the trap came through it melted the copper ore, producing results analogous to those in the Connecticut valley; and thus he concluded that the Lake Superior copper ore is merely a superficial formation reduced from copper ores pre-existing in the sandstone. The presence of silver could also be accounted for; in the great copper regions of Germany which exists from the coast of the Elbe to the banks of the Rhine, in the rich copper mine wrought near Rottengen in 2,000 tons of copper there were found 20,000 marks of silver, or equivalent to 10,000 lbs. weight of silver.

Dr. Jackson said he had doubts before he went up to Lake Superior, but he is now satisfied the copper ores there could not have been reduced from sulphurets by the action of trap dykes.

You may melt a sulphuret of copper in a furnace 1000 times, but you never can reduce it to pure copper unless carbon be present. He was also satisfied that the calcareous spar veins, containing copper which he found there, are true igneous dykes, cutting up through the strata the same as the trap dykes; and that the copper ore of that region is part of the primary copper of the globe. The ore had been traced for a mile, and contained 70 per cent of copper. But still he warned the public against any wild-goose speculations there.

TRAP ROCKS, &C.

Dr. Whelpley then made a few remarks on the theory of the trap rocks of the Connecticut valley, &c. He observed that the new red sandstone here was bounded by ridges of primitive; the dip of the sandstone was a little to the south of east and the trap comes up through conformable to this dip. The trap goes east of north through Connecticut to Massachusetts. Serpentine and argillites principally compose the primitives on the borders. The whole of Connecticut, the west half of Massachusetts, Vermont, &c. were once covered with this new red sandstone. It is seen isolated at Woodbury, Conn.; where the trap is pushed up through the sand, it has vitrified it. The sandstone between the dykes is soft and friable.

Some considerable discussion here took place relative to the origin of the crescent-like form of the trap, which by Mr. Whelpley was thought to be owing to the obliquity of the trap in the original formation, and by Mr. B. Silliman, Jr., to surface denudation.

FRESH WATER FORMATION IN OREGON.

Prof. Bailey gave a very interesting account of specimens of fossilliferous siliceous infusoria, brought from Oregon by Lt. Fremont; they were similar to those found now beneath the peat bogs of the United States, and had ceased to be an object of surprise, although they must cease to be an object of interest. There was an unusual degree of interest attached to these infusorial strata of Oregon, as they occurred under circumstances unparalleled. They are all fresh water infusoria; and are from near the river on the eastern flank of the Cascade Mountains, which are volcanic and are 15,000 feet high, in long. 121° 10′, lat. 44° 35′. Over these infusorial strata there is a deposit of scoriaceous basalt 100 feet thick, beside other strata. So that these smallest specimens of creation have been thus hermetically sealed up to the present day.

Prof. Rogers observed it was a subject of the highest interest that we had at last found a *genuine fresh water formation in the United States*; and over which remains the lava of volcanic craters now extinct, like what is met with in Central France. It was a most interesting matter; and at the proper time he would show that there was also a fresh water formation on the Upper Missouri, and also many others he hoped to find in the United States.

Prof. Bailey said that nearly all these fossil infusoria that he had examined were of species that now existed. He showed drawings of the Eunotia gibba, Spicula of Spongilla, Gallionella distans, Surillella splendida, Gallionella nov. sp., &c. &c.

Prof. Silliman said, then, that down to the limestone of the Hudson river series, &c. we had these microscopic forms accompanying us as far as we had any proofs of life at all.

Prof. Hall said that Lt. Fremont had found specimens in Oregon of the cretaceous period, and some very similar in lithological formation to the Bath Oolite; also south of this he found an argillaceous limestone, and fossil ferns in shale; these were east of where the infusoria were found. The whole of the Oregon region was of the greatest interest to the geologist. Through several degrees of it to the south of where the above were found, there existed immense salt lakes and mountains of salt. And through all the recent limestone formations there the trap rocks have passed up and disturbed the strata from the Rocky Mountains to the Pacific shores. And over all there were seen numerous extinct volcanic hills, and also some volcanoes still in activity.

The meeting then adjourned to dinner.

AFTERNOON SESSION.

After some trifling preliminary business, such as arranging the order of committees, &c. the President said that the subject for the afternoon was

THE TACONIC SYSTEM OF ROCKS.

Mr. Haldeman stated that Mr. Emmons considered he had discovered a new sedimentary rock much older than any of the Silurian series.

Prof. Rogers said himself and his brother had long since shown that all those rocks, supposed to be older than the New-York Paleozoic rocks of the Apalachian chain, are parts of that same series of rocks, folded and changed by plication—by some change of mineral type, and by igneous metamorphoses, which had almost destroyed their fossiliferous character. If Professor Emmons' so called Taconic System was correct, we should have had whole mountains and plains made up entirely of this group. Not merely, as he says, that the Taconic rocks have been uptilted and then the fossiliferous rocks of New-York been deposited on the uptilted edges of the Taconic rocks—the earliest life-bearing period of the globe. Emmons places the lower Silurian rocks of England, and his Taconic rocks, on a level long anterior to the New-York group.

But his fossils, on which he rests this data, are identical with those of the Trenton limestone and the New-York slate. Some few are not identified as yet: but it is impossible to go into a new locality of an old and well explored region and not find some new fossils: but all these others evidently belong to the same species we have already described as belonging to the New-York system. The Nereites of Prof. Emmons give no evidence of belonging to a lower group than those of the older Silurian of England, or the New-York group to which they had already been referred.

Prof. Hall then exhibited a section of the rocks from the slates west of the Hudson river, crossing the Hudson near Troy, and going east to the Connecticut river. He denied that these were any older than the old Silurian range of England, or than the fossilliferous rocks of the Hudson, or Paleozoic groups. He found in them trilobites and encrinal stems and univalve shells precisely similar to those of the Trenton limestone, between Troy and the town of Adams; and still farther east he had found that singular and characteristic fossil, the *Scolithus tubulites* in the granular quartz. If they were an entirely different series of rocks, as Mr. Emmons said they were when he called them the Taconic group, we should not have found the fossils so closely allied to those of the other formations.

Pof. Rogers confirmed this view.

Prof. Dewey still had his doubts about it. He thought they were older than the old Silurian group.

. [The views of the gentlemen who took part in this discussion of the merits of the Taconic system are erroneous. They misunderstand the principles upon which the system is based. Instead of being based on fossils it is really based on *superposition;* the lowest member of the New-York system being superimposed upon those of the Taconic system unconformably. The fossils are employed only as collatteral evidence—and the statement made by Mr. Rogers in regard to them, is far from being true—for there is not a single fossil of the taconic system which is found in the New-York system. Whoever, then, rejects the taconic system, rejects the very principles which he maintains in other cases; it would be equally consistent to reject the evidence we have of the diversity existing between the carboniferous and new red systems. Mr. Rogers says, if the so called taconic system was correct, we should have had whole mountains and plains made up entirely of this group. Though we deem this remark as of little importance, still it is just what we have. The taconic range of mountains, with their valleys and plains are well known parts of the taconic system. The remarks of Mr. Hall are equally untrue. We challenge that gentleman, or any other member of the association, to produce a fossil of the Trenton limestone from a member of the taconic system, and Mr. Hall knows full well that up to the time of this meeting, not a single fossil common to the two systems has yet been discovered. We are happy, however, in observing that the views of Prof. Dewey coincide in the main with our own, and also, that many more distinguished men are adopting views favorable to the separation of the taconic rocks from those which constitute the New-York system.]

ALABAMA PRAIRIES.

Dr. Kane exhibited some specimens of chalky fossil and rocks from the prairies of Alabama, similar to the green sand of Delaware; the bottom of the tertiary. Also some curious statements about the boring for water by artesian wells near the Tombigbee river.

The convention then elected the following officers unanimously:

Dr. JACKSON, of Boston, President for next year.

B. SILLIMAN, Jr. Permanent Secretary.

Prof. Silliman then gave a very brief but interesting account of the iron mountains of Missouri, 700 feet high, made up of large blocks (not strata or veins) of hydrated peroxide of iron; and the meeting adjourned to hear Prof. Rogers' lecture at the Middle Church on volcanoes and earthquakes; after which they all had an elegant supper and conversazione at Mrs. Whitney's hospitable mansion.

SIXTH DAY.

The Chairman, Dr. Dewey, having taken his leave of the Association last evening, with a few appropriate remarks, on the nomination of Prof. Olmsted, Dr. Binney, of Boston, was elected as Chairman.

Dr. Jackson expressed his sense of the honor done him by electing him as Chairman for next year.

On motion of Prof. Rogers, it was

Resolved, That a committee be appointed to memorialize the Legislature of the State of New York on the subject of diffusing the Reports on the Geology of that State.

Prof. Silliman, Prof. Rogers and Dr. C. T. Jackson were appointed a committee for that purpose.

Mr. Dana then read his report on a new and philosophical system of nomenclature, the principle features of which are as follows:

The name originally given to a group or species by its founder should be retained to the exclusion of all subsequent synonyms; the system having originated with Linnæus, this law is not to extend to the writings of antecedent authors.

When several genera are united in one the name of the earliest, if otherwise unobjectionable, should be selected as the name of the whole group.

When a genus is subdivided, the original generic name should not be canceled, but retained for that portion of it which was considered typical by the author.

When a generic name has a synonym exactly equivalent with it in its original application in making a subdivision of the genus, this synonym should not be adopted as the name of either of the new genera formed; *except* when its type belongs to a different section of the genus from that of the other name, and both sections are elevated to genera.

A name of a species already in use for another species of the same genus should be changed; also a generic name in Zoology before employed for a genus in the same kingdom.

When the name of a species is afterwards made the name of a genus to include that species, a new specific name should be given.

In writing systematic names the rules of Latin orthography should be adhered to, except in words derived from proper names, in which only the termination should be latinized.

The best names are those derived from the Greek or Latin languages; the former being preferable for generic names and the latter for specific.

Mr. B. Silliman, Jr. read a paper by Lieut. Johnson, on the Geology in the neighborhood of Fort Ouchita; 70 miles south of the fort he found the same limestone that is found to the north of it, but altered by action of heat with nodules of iron. At Ft. Wayne, on Red river, he found Lignite or Bovey coal, and alum deposit, with springs impregnated with alum; and he believes that the whole of that region was once a large lake rising over all the hills in the neighborhood, and in which the mastadon, &c. used to gambol and luxuriate. Still farther on he found granite rocks, similar to that found ten miles south of Fort Ouchita; also fifteen miles north and west of the fort; also, limestone changed by heat, containing iron; west of this the granite bears east and west; then the limestone bears south 10 degrees east; then the strata become warped and stand east and west. And in many places he found where bitumen had just ceased to flow; and one place where it was still flowing. The extensive settlement of

Texas, away towards the Rocky Mountains, is *geologically impossible*, for the greater part of it is an uninhabitable desert, incapable of cultivation; leaving the habitable portion of Texas a place no larger than the state of Missouri.

Prof. Hall remarked on the utility of crustacea in the identification of strata. He had identified 60 species and 22 genera of trilobites in his recent survey. He also stated that he had had for two years in his possession a specimen of *a recent trilobite* (a remarkable and new fact) picked up on the shores at New Bedford; the eyes are precisely like those of the trilobite (pediculus marinus trilobus) and so is the general shape of the body; he believed it a genuine species of calimina; although the trilobian structure was not quite so perfect as those of the fossil trilobites of the Dudley and Trenton limestone.

Mr. B. Silliman, Jr. then read a very interesting paper by Dr. Dickerson, of the Geology of the Mississippi Valley, which showed that stalactites and mastodon bones have been found in the Natchez bluff. Also, a description of a curious animal found in the Mammoth Ravine, as it is called, near Natchez, which is styled the "nondescript." Its head was 18 inches long and 11 inches wide; there was a place for a trunk like that of the elephant; the tusks were 11 inches long; there were no traces of any eye sockets; no foramina for the passage of an optic nerve; no place for eyes at all; it was a blind animal; had 16 teeth; its fore leg was five feet long, and very powerful; the bones were completely fossilized, and were very ferruginous.

Another paper, by Col. Wailes, showed the miseries that were suffered in Mississippi for want of any rocks or stones; on this account, they had nothing to check the overflowing or off-cutting current of the river with ; no stones to build embankments with ; no stones to make roads with, or to keep roads in repair; no stones to build abutments for a bridge ; so there are no bridges ; no stones to build cellar walls with ; so all the houses are built on sticks. Truly, a lamentable state of things for Mississippi. The paper also spoke of the numerous bones of the mastodon, found in the mastodon ravines in Mississippi. The only stone found in Mississippi, is that found at Grand Gulf and Jackson ; it is a tertiary sandstone, very poor, and liable to decay ; and the State House at Jackson is built with it. The only waterfall in Mississippi falls over this sandstone and is *five feet high !* In the bluffs near Walnut Hills, fossil shark's teeth and many fossil shells are found. Iron ore has not yet been worked in Mississippi, but there are many beds of iron in the state. The marl is abundant, and will be very valuable to the planter ; and can be found in any of the ravines ; 700 bushels of marl have been put to the acre, and the crop of cotton, corn, &c., has been much increased thereby ;

and exhausted cotton lands can be renewed by it, avoiding the necessity of opening new plantations; this marl contains 35 per cent of carbonate of lime. Specimens of nearly 20 mastodons have been found above the blue clay, and in such a state as to show conclusively that *these mastodons perished where they are found!* The teeth, &c., of the fossil horse have been found, showing that these antedeluvian horses were not unfit associates for the horses of the present day! And above all other remarkable facts, there has been found actually *a piece of human skull* lying in the same bed with the nondescript blind animal before described, and in a state which shows that this piece of the human skull has undergone precisely the same changes as the bones of that animal, and the same degree of fossillification. There can be no mistake in this being the skull of a human—an animal that walked upright; and one that must have lived at the same time with that nondescript animal. Some remains of the large Saurian have also been found in the blue clay near Jackson, Miss.; the joints of the bones are beautifully perfect, six inches in diameter, and twelve inches long. This animal was 100 feet long, and is believed to be found only in the United States. Shark's teeth, &c., were also found in the same soil.

Prof. Rogers regretted that more had not been done towards determining the geological age of the basiloro-saurian, or zeuglodon. He moved a resolution that a committee be appointed to enquire into and determine the geological age of that animal. This was carried, and Prof. Rogers was appointed that committee.

Prof. Bailey read a very curious paper on fossil coniferous wood.

Mr. B. Silliman, jr., then called attention to the abundance of cobalt found in the mine La Motte, Missouri.

Dr. Jackson then said that the glass-makers of New-England were much troubled by the cobalt in the red lead made from the mine La Motte lead ore; it makes blue flint glass instead of white; and is easily tested by putting the red lead in a crucible and melting it with borax; if a blue bead results, then cobalt is in the red lead.

AFTERNOON SESSION.

Mr. B. Silliman, Jr., then made a few very interesting and able remarks on the cypress trees of the Mississippi region, and of the bayous of that place. He alluded particularly to the peculiar manner in which the cypress tap roots and knees grow under water, and convert water into land.

Mr. Whelpley then made some remarks on the similar way in which the northern lakes were filling up with vegetable matter.

Mr. B. Silliman then read a paper by Dr. Webber, on a new form of attraction.

It was then resolved that the committee on State surveys should be continued in connection with the United States linear surveys. Professor Rogers proposed that this society should be called the "American Society for the Promotion of Science;" the initiation fee to be two dollars, the annual payment one dollar, and a fund to be raised for publishing and forwarding their views; and also to apply for an act of incorporation. Laid over till next year.

The following names were then announced as committees on the sedimentary deposits of rivers:

Mississippi River—Dr. W. W. Dickenson, Riddell, Forshay.
Connecticut River—Prof. Johnson, Dr. Barrett.
Kennebec River—Prof. Loomis.
Susquehannah River—Prof. Haldeman.

Some remarks were then made on the value of the phosphates in agriculture; and Dr. Jackson showed that Earl Dundonnald pointed this out in his work in 1795, long before Liebig ever thought of it, or was born.

Various votes of thanks were then passed, and the Association broke up in high glee, till September, 1846.

[From the Farmers' Cabinet.]

JAMES GOWEN'S REPORT TO PHILADELPHIA AGRICULTURAL SOCIETY.

To the Committee on Farms:

Gentlemen—It is known to most of you, that since I became a farmer, I have spared no pains to fulfil the duties of the calling, in a manner creditable to the community in which I live, as well as to myself and the Agricultural Society to which I belong—that while improving my own practice, I have endeavored, by sundry means, to stimulate others to compete with me in spirited efforts, to arrive at excellence in the highly useful and delightful pursuits of agriculture; and to promulgate as far as in me lay, such improvements and results, as were likely to promote the general interests of the farmer. In carrying out this object, I have as part of the system, always been found competing in crops and cattle, for the premiums offered by "The Philadelphia Society for promoting Agriculture." It is therefore in accordance with this practice, that I now present my farm as worthy of note, when you come to award the premiums committed to your distribution: in view of which, and in fulfilment of the rules and regulations of the society, I submit for your consideration a general statement of its character and condition.

The homestead farm contained, when I removed to it in 1834, about 60 acres; since then I have added to it by purchase, some 40 acres, all of which is contiguous; making over 100 acres, exclusive of the woodland farm in Cheltenham township, Montgomery county, part of which is cleared and worked by me, and is in fine condition, as you may recollect from my communication on the crop of rye raised there in 1842.

From long neglect and a bad practice, previous to my coming on the homestead, I found it in every respect in a wretched condition. The results of bad ploughing and bad seeding, were visible in the unevenness of the surface; and the pernicious weeds that seemed to have entire possession. I at once took up the old fences which divided about 40 acres into small fields, ploughed it up, eradicated the briers and brambles that filled so large a space along those fences, and removed the stones within ploughing depth. It was cropped according to circumstnnces—alternately with potatoes, corn, grain, &c., until the soil had been brought into proper subjection in the fall of 1839; when it was laid down for grass, by sowing it with grain and timothy; since which it has not been disturbed, with the exception of about eight acres in rye, this year; and yet this last summer it cut, I may safely say, two tons to the acre, and expect it to do as well next summer, should the season prove favorable. By this practice I brought every inch of the land to bear, and saved ten years expense, or wear and tear of the six fences which formerly stood inside this section. The fields in future will be divided by hedges of the *Maclura thorn, or Osage orange*, raised by myself; four of these hedges already in, with plenty of quicks on hand to supply the remainder. These remarks you will please observe, apply to the land lying on the southeast side of the lane that divides the farm. The land on the northwest side, opposite, called the Spring fields, was, if possible, in a still worse condition. Owing to the swampy nature of part of it, and the washings from the higher lands on the other side the lane, the posts were every spring thrown out of place as the frost left the ground, while the ravines furrowed out by the thaws and heavy rains, set at defiance all attempts at cropping or farming. To obviate the yearly setting up of the fences, which was not only expensive but vexatious, I substituted a stone and lime wall for the post and rail fence. The wall is about half a mile long, is two feet below the surface at every point, two feet broad at base, and averages over six feet high from bottom, ending with an eighteen inch coping. One large under drain, with grating at mouth, takes the water from the lane, while several smaller drains keep the surface of the land perfectly dry. The ravines were well killed up, and ever since, for a series of years, good crops of potatoes, corn, grain and grass, have been taken, where formerly grew spatterdock and rushes.

The land added to the farm at sundry times within the last five or six years, was, in the general, in as bad a condition in many respects, as the worst of that already described; indeed, it could furnish material for a more repulsive picture than any that has been drawn yet; but as most of you have repeatedly seen it in its original state, I need not trouble you with a description. To show its condition now, I need only remind you, that two years ago I obtained a premium for raising upwards of four hundred bushels of Mercer potatoes to the acre, on this land; and that on the succeeding year, from the same potatoe land I took upwards of fifty bushels of wheat to the acre, without any additional manure. Also, that last year I submitted a field of some seven acres of corn, on another portion of this land, which yielded at the rate of 200 bushels of ears, equal to 100 bushels of shelled corn, to the acre. My reports on the condition of these fields, and the aforesaid crops, are in possession of the Society. The corn land was in this year with potatoes and oats. The potatoes, four acres, yielded over 200 bushels to the acre; the oats were very good—it is now laid down with wheat and orchard grass. This sketch, with your own personal observations, will afford you some idea of what I had to contend with, and what I have accomplished in the way of improving land, and the present condition of my farm.

From the difficulty and expense in procuring manure from the city, and after three or four years experience in that mode of supply, I gave it up, and adopted the plan of making a supply on the place, by an increased stock of cattle; from which I have derived my sole supply ever since, with the exception of light dressings of lime and gypsum, and a small lot of stable manure which I was tempted to purchase a few weeks since at auction, and which I can dispense with, should I meet a purchaser before its removal in the spring. The keeping and breeding fine stock had in itself strong claims upon my judgment, as well as my taste; as I could never think a farm was what it should be, unless it could exhibit fine cattle, as well as an improved culture. To maintain this stock, and bring my land to a high state of cultivation, by the most efficient and economical practice, has been a leading object; and to accomplish this, required no ordinary management on such a farm. The stock in cattle has ranged for years, from forty to fifty head, in addition to the necessary horses, with a large stock of swine for breeding and fattening; and these I have fed from the produce of the farm, except the purchase occasionally of some straw, and supplies of mill-feed for the horses and swine, and some meadow hay for the cattle, selling frequently its equivalent in timothy. During the same period, I have sold hundreds of bushels of rye, some wheat, and on an average, four hundred bushels of potatoes annually, with some three to four hundred bushels of carrots, besides providing for the family. But the chief income was derived from the cattle, of which I shall speak more at large presently.

My expenditures during the whole period, could not be otherwise than large; as I could not put up so much stone fence, and picket fence, as inclose my farm, without incurring a heavy outlay; but I view these improvements as cheap in the end. It may be safely inferred, that there is not at this day, any farm of the same extent in this part of the country, that can so easily be worked, or will require so little expense for a series of years in keeping the fences in order, especially when the hedges are taken into account. I am also of opinion, that taking in view the condition of the soil, as to depth and richness, as well as its being entirely free of stones and other impediments, that I can make it produce as much as any farm of its size in any part of the country, for a series of years, and at as small an expense.

The secret of keeping so large a stock on so little land, consists in my practice of partial soiling, and green crops, whereby I make some four or five acres do the work of thirty acres, in the "slow and easy go way." From May to August, my cattle are confined to one or two fields, most commonly one, to which they are driven, more for exercise, in the cooler parts of the day, than for pasture; they being fed in the stables, early in the morning, at noon, and at night, with food cut for them from a lot adjoining the barn-yard. This food is generally of lucerne, orchard grass and clover, oats and corn. The patches from which the corn and oats are cut, are always sowed with turnips in August. No one can credit, unless he has had proper experience in the matter, the quantity of food that one acre of lucerne, one of rich orchard grass and clover, and one of oats and corn, afford from May till August, nor can he estimate the great saving in manure, much less the comparatively good health of the cattle, from not being exposed on naked fields, under a fervid sun, toiling all day in search of food. This practice allows me to crop almost the whole of the land, and to make some 120 to 150 tons of hay annually. In the fall, from August till November, the cattle have the whole range of the mowed lands, as I do not cut second crop grass for hay. Then for winter feed, I have always an acre of sugar beet, half an acre of sugar parsnips; half an acre or more of carrots, for my horses; and generally three to four acres of turnips. I report to the committee on crops this season, over 100 tons of these roots. In 1843, I gathered from one acre, 1078 bushels of sugar beets, 60 lbs. to the bushel; carrots at the rate of 687 bushels; sugar parsneps, 868 bushels. This year, 972 bushels sugar beets; 970 bushels carrots; 700 bushels sugar parsneps; and from three and a half acres, 2500 bushels of turnips, sowed with timothy seed.

The farm buildings consist of three substantial stone barns, one 70 feet by 33, another 50 by 26, and another hipt roof with cupola, 57 by 25, besides a large overshoot stable and hay-house, stable high, of stone, 60 feet by 30—the lower floors of all these are made of broken stone and lime, planked, being vermin proof. There are also a corn crib capable of holding 1200 bushels corn, one barrack, ample hog pens, and sheds for carts and wagons. The barn buildings have been filled this fall to their utmost limit, except the corn crib.

A substantial stone wall encloses the principal manure heap; the drainings from this heap are led into a place of deposit, in which are received also a drain that runs under ground from the kitchen, as well as drainings from the pig pens, and the washings from all the yards. These drainings form an important item in the supply of manure to my land; it is a saving which I cannot estimate at less than $200 a year. This liquid by a simple process is applied to the patches of roots, &c., and to this may be ascribed my great success in raising such crops.

The dwellings, green-house, shrubbery and gardens, I need not describe; but it is in point to notice the nursery of young ornamental trees, and Maclura for hedges, raised on places mostly waste on other farms, from which I have an ample supply for my own setting out, and a considerable stock to spare of Magnolia Tripetalla, or Cucumber tree, and Silver Maple, of fine size, suitable for transplanting. I sold over fifty dollars worth last spring of these trees, and have several hundred dollars worth still on hand, for sale.

Of improved cattle, my first effort was with the celebrated "Dairy Maid," still owned by me. Her first calf, Leander, by Whitaker's Prince of Northumberland, was reared, and kept by me, for breeding. Dairy Maid's calves alone, exclusive of Leander, have already sold for more than $500. It would be curious to trace her profit at this day, by stating an account of her first cost, her keep, and that of her son Leander, crediting her by sales of her own calves and grand calves; deducting for the portion of capital which was invested in the dams that produced the grand calves. To do this would extend this paper to an unusual length. Suffice it to say, that Dairy Maid has long since paid for herself, and that those who laughed at me for giving $540 for one cow, may turn this statement over in their minds, and think, whether since 1838 any investment of theirs, to same amount, in any other branch of husbandry, has paid so well. But they may exclaim, "I cannot do the like again." Yes, I can—for if the price of fine cattle be reduced through their becoming plentier, (thanks to those who made them plentier,) the principal invested may not be so large, in the purchase of one animal to begin with, but there cannot be a doubt if she be superior or superlative, the produce of of such an animal will realize as good a percentage in future, as did that of Dairy Maid. But there is a satisfaction beyond that of the pocket, and that is, that Dairy Maid's breed will be of infinite service to the country. Her calves and grand calves, are pretty well scattered already—and I make no doubt, but wherever found they will demonstrate the high character of the parent stock.

My sales for the last two years, exclusive of Dairy Maid's calves, amount to over $2000. The stock now on hand is about forty head, principally Durhams, among which are Dairy Maid, Cleopatra, Walnut, Victoria, Ellen Kirby, Miss Model, Victorina, Judy, Bessy Bell, &c. &c. The butter sold for the last two years exceeds $750; this is a respectable item, when the calves that were reared and the supply for my family are taken into view. From early fall to spring, the butter averaged 70 lbs. per week—the quality highly appreciated abroad, as well as at home. In butter, cream and milk, there is no stint at Mount Airy; so of fruits, vegetables, hams, &c. If I be a large producer, I may be also classed as a large consumer; and did I not produce, the markets would have to suffer accordingly.

In the hog line, I have been quite successful, at least in bringing the animal, by judicious crossing, to great perfection. I fatted off my old Lincoln and Berkshire boars, and my Hampshire and Chester county sows, last month; they weighed from 400 to 450 lbs.; sold for $86.24. Have sold the last two years of pigs, designed for breeding, $150. Bacon, lard, &c. over $120, besides having on hand 14 fine young barrows, last fall's pigs, now ready for slaughter, which will weigh from 250 to 300 lbs. each, value $150. The stock on hand consists of one fine boar of Lincoln, Hampshire and Berkshire breed; one brood sow of Berkshire breed, twelve shoats and seven pigs. The sow and pigs are the same that took the premium at the last agricultural exhibition.

Building and work, independent of the farm, induced to the keep of a heavy stock of working horses, consisting of five, employed occasionally hauling stone, sand, &c. They are the same horses originally purchased at and since the commencement of my farming operations; having neither *sold*, *lost*, nor *exchanged one*. The two carriage horses average 20 years old each; my favorite of these is quite 25; so much for management in this department. The implements—wagons, carts, ploughs, harrows, &c., &c., are in keeping with the farm, and are well kept as you may have observed.

I keep no farmer on the place, in the character of manager, having never as yet been able to find a man qualified to conduct the operations of the yard and field in manner as they should be.

My practice is to hire one man for general work, at $20 to $25 per month; also, two hands for out-door work alone, who are capable to work at any job of farming; they have employment from early spring till first of December, at 75 cents per day—these three find themselves. Then there are two men engaged constantly, feeding and taking care of cattle, feed, manure, &c., who receive from $10 to $12 per month and found. By this arrangement I have always a pretty strong force to act on emergencies, and to avail myself of seasonable operations. My work is generally well done and timely done.

I have thus given you a general insight into the condition of my farm, and the system by which it has been brought to its present state of perfection. If substantial fences, clean fields, well worked land, good crops, good barns and splendid cattle, be essential to constitute a good farm, I trust you will find none of those features wanting on mine.

Very respectfully, your obedient servant,
JAMES GOWEN.

Mount Airy, December 24th, 1844.

AMERICAN CHEESE.

On the motion of Sir P. Egerton, one of the members for the county of Cheshire, a return has been laid upon the table of the British House of Commons, relative to the importation of foreign cheese which exhibits the following figures :

	From Europe.	America.	Total.
1841,	254,995	15,154	270.149
1842,	165,614	14,098	179,712
1843,	136,998	42,312	179,310
1844,	160,654	53,115	213,769

By this statement we find that the importation of American cheese has quadrupled during the last three years, and during the last year the importation amounted to 53,115 cwt. To our American friends we say—send to this country nothing but a good article—introduce more color into it, and we are sure that in another year England will use four times the quantity of its previous consumption. We shall also be pleased to find that the manufacturer and exporter get a larger share of the prices for which it is sold in England.

The writer of this has now upon his table an American cheese, equal to the celebrated "Stilton" for which twenty-five cents per pound is obtained, while this excellent "American" is sold at thirteen cents only. A similar return has also been made by order of the House of Commons, containing an account of the quantities of cured provisions of all kinds imported into England from our colonies and foreign countries, for the year ending January 5, 1845.

The following are the particulars of the return:

	1843.	1844.
Salted beef, ...	60,633 cwt,......	106,766 cwt.
Salted pork, ...	27,118 "	30,780 "
Ham of all kinds,..........	6,919 "	6,732 "
Bacon, ...	448 "	36 "

It also appears that a large quantity of that imported in 1844 was taken for ships' stores, viz: salted beef 77,248 cwt.; salted pork, 16,987 cwt.; hams of all kinds 6, 298 cwt.

GERMINATING SEEDS UNDER COLORED GLASS.

THE following remarks by Mr. Hunt, the Secretary of the Royal Polytechnic Society, in England, relate to a most curious discovery; and one which may prove very useful to the cultivators of rare exotics. We hope some of our readers will be stimulated to repeat the experiments, and to send us the results.

"It is scarcely necessary to explain that every beam of light proceeding from its solar source is a bundle of different colored rays to the absorption or reflection of which we owe all that infinite diversity of color which is one of the greatest charms of creation. These rays have been known to possess different functions.

"The light which permeates colored glass partakes, to some considerable extent, of the character of the ray which corresponds with the glass in color; thus blue glass admits the blue or *chemical* rays, to the exclusion, or nearly so, of all the others; yellow glass admits only the permeation of the *luminous* rays, while red glass cuts off all but the heating rays, which pass it freely. This affords us a very easy method of growing plants under the influence of any particular light which may be desired.

"The fact to which I would particularly call attention is, that the yellow and red rays are destructive to germination, whereas, under the influence of violet, indigo, or blue light, the process is quickened in a most extraordinary manner.

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AGRICULTURAL GEOLOGY.

On the agricultural adaptations of that portion of the Taconic Region which comprises the Counties of Dutchess, Columbia, Rensselaer and Washington in the State of New-York, and Berkshire in the State of Massachusetts.

THE adaptation of certain belts or sections of country for particular products, is one of the first subjects to which agriculturalists ought to direct their study. As yet it has received but little attention, and that little has been bestowed in so vague a manner that the data hitherto collected are insufficient to found a sure basis of agricultural practice. We hear, for instance, of a wheat-growing region; of a grazing country: but the reason why they are particularly adapted to these ends is imperfectly understood. If the inquiry is put to the farmer, Why certain parts of the western country produce wheat? he would be puzzled to return an answer, and perhaps would be obliged to state the simple fact that the land is found by ample experience to yield good crops of this grain. And again, if the inquiry should be varied and put into this form, Why cannot wheat be raised in a certain other section of country? the answer would probably be similar to the preceding, or simply an appeal to experience. It is true, that in some cases, a particular cause may operate locally to interfere with the growth of a given crop, as the prevalence of insects, or some other equally deleterious temporary influence. These special cases, however, are not those we have in view, and hence will not affect the truth of our proposition, that the particular adaptations of certain belts of country require farther investigation than they have hitherto received.

The condition and composition of a soil are important points of inquiry; inasmuch as upon these, and a few other modifying causes, depends the peculiar adaptation in any given instance, and the capability of being fitted for any given product in its highest state of perfection. It is proper, however, to proceed with greater particularity, and enumerate the most important circumstances which modify, or in fact create conditions, that adapt soils for certain kinds of crops. It is proper to say that causes operate in very different degrees, or they are not by any means of equal power; and it will probably be found that some, which have heretofore been but little thought of, act with greater effect than has been suspected. Of the circumstances which modify the adaptations of soil, it is considered that the presence of sand, clay, and of many of the earths, are among the chief. In addition to these, the character of the subsoil, and of the surface rock, are quite important. Then, again, climate is not to be left out of the list of modifying causes. Only a slight variation in this particular may in many instances forbid the cultivation of crops, which, at a little distance only, are profitable. But in considering the crops adapted to a particular region, it is undoubtedly proper to make the following distinction, namely: those which will grow tolerably well, and really ripen their seeds or fruit; and those which reach a high state of perfection (the quality of the first class being inferior to that of the second). Now here is a case which requires a nice judgment, and the question of profit comes up; and it is on the question of profit alone that the farmer is to decide whether he will grow this particular crop, or some other. It is not whether it will grow and make something; for it is sometimes the case that the whole question of profit turns upon the difference of value between a good article and a middling one, and it may be supposed that the difference of expense in cultivation will be in favor of the good article. This will appear to be true, when we consider that where nature has done her work well, there is less left for man to do: he is saved much labor and expense in preparing the ground. But then again there is another question to be considered, namely, that though the producer cannot compete in market with an article superior to his own, yet will it not be profitable to cultivate it for consumption at home, or in the family; or will it be better to pay in labor at the rate of one dollar for a bushel of wheat, than eighty-seven and a half cents in cash to a neighbor? There is still another view of the subject, and it is one which relates to the adaptations of certain sections of country. It is this: As Mr. A.'s farm produces excellent corn, and Mr. B.'s produces excellent wheat, may they not effect a mutual exchange of their products; or, if they choose, each of them turn their grain into cash, and thus supply their wants at a cash price? These are questions which are continually arising, or at least ought to be considered and taken into the account before a farmer determines upon a particular crop or a particular kind of husbandry. The bare fact that a particular kind of grain will ripen, is not sufficient cause why we should engage in its culture. The questions are, will it be profitable in market; will it be more profitable to consume it at home, than to furnish my family with it by means of cash in hand? The expense of taking to market, and of going to market to buy, will often decide these questions. A farmer, for instance, can afford to take cheese or butter to market, but not wheat or oats.

With these remarks, we proceed to the subject before us, the character and adaptations of the soil of the counties we have named at the head of this article. These counties, taken as a whole, possess great uniformity of soil; as well in the composition as in position and exposure. This uniformity is due to geological causes: causes, which, on the one hand, originated the soil, and, on the other, distributed or spread it over this particular territory; and we may as well speak of these causes now, as at any other time or in any other place. In the first place, we need only say, that the soils were derived from the same rocks upon which they now repose. This is not often so distinctly the case as in this instance. The result here is due to two causes: first, the strike of this system of rocks; that is, they extend nearly north and south several hundred miles, passing beyond the Provincial line on the north, where they still continue in this same direction through the eastern counties of Canada. The second reason why the soil is the same as that which the rock would produce, is, that the special agent, whatever it may have been, which was instrumental in distributing the soil, moved from north to south. In consequence, then, of the great extent of these rocks to the north, and of the movement of the soils from north to south over them, they possess the same character that they would have held had they never been subjected to the distribution here described. It is unnecessary to dwell farther upon these geological facts : it is sufficient to state them in this place as facts, which we may at some future time consider in other points of view. We may, however, refer the reader to an article in the third number of this Journal, on the subject of *drift*, in which the facts and principles relating to the movement of soils is treated generally. It will be seen that the subject is one of great interest, and is of much practical importance.

This belt takes in one entire system of rocks in breadth, extending, according to observation, from the Hudson river and Lake Champlain, to the foot of the Hoosic and Green mountains in Massachusetts and Vermont. It passes over one entire range of mountains, viz. the Taconic, lying between New-York and Massachusetts, and extending north into Vermont and Canada. The breadth of this belt is between thirty-five and forty miles ; and so far as physical and chemical characters are concerned, the soil of this whole belt is very uniform. Far to the north, climate will of course alter or change the husbandry ; but were it not for this, we might consider the belt as extending through Pennsylvania and the Southern States. As climate is an important element in husbandry, we propose, first of all, to call the reader's attention to this subject.

Climate.

From what has been observed in regard to the extent of this region, it will be understood that there must necessarily be both variations and differences in its climate. Extending far north, it must necessarily pass into a rigid climate ; and to the south, into one that is mild and temperate. Between the Canada line on the north, and Mount-Pleasant on the south, there must obtain a difference of 3 – 4° in mean annual temperature. There will also be found a difference of temperature between the level of tide water at Hudson, Albany or Troy, and the mountain belts which traverse this region from north to south, of between 4 and 5 degrees. Nevertheless, with these differences of temperature either from latitude or elevation, none of the ordinary products fail of returning good crops, when well cultivated.

The climate of this region will be better understood by giving the results of observations, commencing in the north at Granville, Washington county, lat. 43° 20′. Its elevation is estimated at 600 feet above tide. Its mean temperature, as observed, is 46°.03. Its mean temperature due to latitude and elevation, is 45°.41. This gives 0.46 lower temperature than the mean for the State of New-York.

Salem, 18 miles south of Granville, lat. 43° 20′. The observed mean temperature is 45°.54. Temperature which is due to latitude and elevation, 45°.59. This result is 1°.35 less than the mean for the State.

We select, in the next place, a town upon the eastern verge of the district, viz Williamstown (Mass.), lat. 42° 43′. Elevation 800 feet above tide. Mean temperature, as observed, 45°.59. Calculated temperature, 48°.16.

Lansingburgh, which is nearly west from Williamstown, on the extreme western verge of the district, is the next place at which observations have been made. Elevation, 30 feet above tide. Mean temperature, as observed, 48°.17. Due to latitude and elevation, 47°.96.

Poughkeepsie, on the east bank of the Hudson, lat. 41° 41′, and elevated 50 feet above tide. Mean temp., as observed, 50°.74. Due to latitude and elevation, 49°.67.

The last and most southern point to which our observations are intended to extend, is Mount-Pleasant, in lat. 41° 09′, and elevated 125 feet above tide. Temperature, as observed, 50°.08. Due to latitude and elevation, 50°.30.

The difference of mean temperature, as observed, between the most northerly and southerly points of observation, is 4°.94, within a range of latitude of 2° 11′.

Several of the places in the range of our observation are noted for the extremes of heat and cold, or for the wide range of the thermometer; and some are noted for early frosts, which in some places are ten days earlier than at others. North-Salem, Kinderhook and Lansingburgh experience frosts earlier by ten days than does the valley of the Hudson generally; and the opening of spring, too, is many days later at the former places. These latter considerations are important practically. The foddering season is thereby lengthened, and the maize crop runs a greater hazard of being cut off or injured by frost, and hence the necessity for the farmer to put in requisition all his means to secure this crop from a failure.

The changes of temperature, though they are gradual as we ascend the Hudson, are more sudden and abrupt at some spots than can be accounted for either in elevation or in latitude. It may be, and probably is, often due to cold winds, from which some points are less sheltered than others ; and were our observations extended, so as to embrace a greater number of places, many more would be found in this section of country equally bleak and frosty.

From data obtained from the Reports of the Regents of the University of the State, it is found that this belt of country does not enjoy so mild a climate as Western and Central New-York. The extremes are greater and more sudden ; though it is questioned whether it is not as exempt from early and late frosts as those parts of the State, with the exception of the limited belts which extend along the inland lakes. In the Taconic region, there are no bodies of water to exert a perceptible influence either in retarding the appearance of frosts in the autumn, or in warding them off in the spring. In this section, however, the severity of the frost never destroys forest trees, as it has in some parts of St. Lawrence county, and it is extremely rare that their foliage is injured to any great extent in the spring. Corn, when in the blade, rarely suffers in those places where it can be grown to advantage. The leaves are, indeed, sometimes killed to the ground, but the plants immediately spring up and grow without suffering damage.

Quantity of rain.

Our data are insufficient for the whole district, as the observations are limited to four or five places. Selecting a single year, we will give the results which have been obtained.

In Granville, Washington county, the whole quantity of rain which fell during 1844, was 28.88 inches. In Lansingburgh it was 26.94 ; Kinderhook, 39.49 (and the average 35.55 for 9 years). In Mount-Pleasant, 23.31 (in 1832, it was 53.46 ; 1834, 40.97). As these places are all virtually in the valley of the Hudson, the average quantity of rain which fell in that year was 30.35 inches.

The number of clear days at Kinderhook the same year, was 195 ;

at Lansingburgh, there were 209. The number of cloudy days at the former place was 122; at the latter, 111. These places are central for the Taconic region, as it regards north and south. At Granville, Washington county, in the north, there were 192 clear days, 174 cloudy, 51 rainy, and 16 snowy days. Towards the south, at Mount Pleasant in Westchester county, it was clear 199, cloudy 166, rainy 107, and snowy 19 days. These observations are strictly in the valley of the Hudson. The results would be different if observations were made along the bases of the Taconic and Green mountains.

GEOLOGICAL RELATIONS OF THE UNDERLYING ROCKS.

The surface rocks, as a class, are slates, differing somewhat in durability, or power to resist the action of the weather. Those of the valley of the Hudson are more disposed to decomposition than those of the eastern part of the district. Limestones and sandstones form only narrow and inconsiderable belts, running in the direction or parallel with the mountains and hills. The following is considered as a sufficient description of the rocks of this system.

Skirting the valley of the Hudson, and the shores of Lake Champlain, a green slate constitutes the surface rock. It embraces a few thin non-fossiliferous beds of impure limestone; besides which, it is often traversed by thin seams of calcareous spar. This slate is often fragile, and disintegrates easily; and it forms an excellent argillaceous soil, though it contains some lime. At many points it crops out beneath the Calciferous sandrock, one of the oldest rocks of the New-York system. This belt of slate forms the surface rock almost fifteen miles in breadth; or, it continues east to Canaan in Columbia county, where it is succeeded by the Sparry limestone, a rock which is about 500 feet thick. In composition, this slate is composed of silex, alumina and iron, with a trace only of magnesia and lime. Seams of white quartz are not uncommon. But this slate does not resemble in composition the Hudson river shales, although it is considered by many as identical with them. It contains more alumina and iron, and much less lime and magnesia: the iron is in a state of protoxide. Some inconsiderable patches or belts of it are largely charged with what appears to be a mixture of the hydrous peroxide and the carbonate of iron. When composed thus, it forms a deep red soil, which yields excellent grass for sheep or cattle. A place opposite Catskill is of this description, and may be seen from Catskill point.

The Sparry limestone forms a long belt, running near the base of Petersburgh mountain, north through Arlington in Vermont. A point where it may always be recognized, is the tunnel for the Great Western Railway. The tunnel is 500 feet in length, and 200 feet below the surface, and is wholly in this limestone. The adjacent slate is black, in consequence of decomposed pyrites. This limestone contains some alumina and magnesia. It may be distinguished by its checkered appearance, which is owing to narrow seams of white calcareous spar traversing a dark blue ground; for there are certain other limestones which resemble this, and from which it cannot be known with certainty unless inspected in place. This rock decomposes slowly, and thus makes but little soil. Slate of a coarser kind succeeds the sparry limestone eastwardly; and it is immediately to the east of the sparry limestone, that the range known as the Taconic mountains occurs. These are almost entirely made up of a silvery gray slate, in which we find rarely thin beds of impure limestone: it is called magnesian limestone. This rock forms a warm soil; but most of the country where it is found, is high land. It abounds in masses of milky quartz, in the cavities of which we find carbonate of iron. Chlorite also is common, and is mostly associated with the quartz.

At the eastern base of the Taconic range, we find the Stockbridge limestone. It is white, gray or clouded, and is frequently a dolomite or a magnesian limestone. When thus composed, it is often very friable and tender, and subject to disintegration. It is also frequently siliceous, and then it is equally disposed to crumble. It forms, in both cases, a warm and excellent soil for maize and grass.

Another range of slate succeeds the Stockbridge limestone on the east; but as its characters are nearly the same as that which forms the Taconic mountains, we pass it by without further remark.

The last rock of this system, is the Granular quartz. The lowest part of it is a puddingstone or conglomorate, sometimes a ferruginous breccia. The main body of the rock is an indestructible fine-grained sandstone. Sometimes, however, it is granular and friable, and then forms the white sandy quartz. The soil it makes is coarse, and siliceous in an eminent degree.

The rocks which we have now imperfectly described, form belts which run nearly north and south to an indefinite extent, and parallel with each other. Sometimes they are intercepted by the operation of a variety of geological causes. On the east side of this system, the quartz rock reposes against and upon the gneiss and mica slate of the Green mountains; and on the west, the Taconic slate passes beneath the New-York system in the Hudson and Champlain valleys, which fact may be seen at Burlington, Charlotte and Addison in Vermont, and at Whitehall, Bald mountain, Galesville, Granville, Lansingburgh, Troy and Greenbush in New-York, besides many other places which might be mentioned. The order in which they may be studied to the greatest advantage, is to pass over the system from west to east, or from the great vallies of the Hudson and Champlain to the top of the Green mountains. The bands or belts of rock which have been described, will be found in the range of the places which have been given, either north or south of them as the student may be located.

SPRINGS OF WATER.

The springs which gush from the Taconic hills, and which have their origin mostly from the slate, in many instances yield comparatively pure water; at least, it contains less lime in combination with acids, than is found in the water from the slates of the Hudson river. We have springs which contain only four grains of solid matter to the gallon. A few weak chalybeate springs flow from the slates without regularity: they are all small, and take their origin from the slate, charged with sulphuret of iron or pyrites. The most interesting springs, however, are the nitrogen springs of Hoosic, Lebanon and Williamstown. The water of these springs is soft, and has a temperature above the mean of the place in which they are situated. They do not come out from any one of the rocks exclusively, but are supposed to indicate a fracture extending deep in the bowels of the earth, and with which they are connected. These springs, too, are the largest which occur in this vicinity, some of them discharging sufficient water to turn a mill-wheel. The wells of the valleys, especially when sunk in clay, fill with hard water, and frequently contain gypsum in solution; but when sunk in gravel or sand, they often furnish soft water. The temperature of the water of some of these wells is as low as the mean of the place, not differing much from 45°.

The form and surface of the whole section under consideration is well calculated to furnish a great abundance of water, in springs, brooks and rivers. It is, in other words, well watered; and what is of the greatest importance, a very large proportion of the farms might be irrigated by the small streams of the hill-sides, although as yet no attention has been given to this very feasible and efficient method of increasing the productiveness of the soil. The small quantity of lime which these streams frequently contain, would be a useful acquisition to the vegetation of the region.

FOREST TREES AND WILD PLANTS.

The whole range which we have under consideration, forms but one botanical region. There are, it is true, plants of the mountain and plants of the valley, yet the mountains nowhere become strictly alpine. The greatest change appears upon Graylock, the highest point in this region, where the forest trees become dwarfish, but by no means excessively so.

The number of species of wild plants growing in this region will not differ materially from 1500, exclusive of the Cryptogamia. There are upwards of seventy species of forest trees, including, however, a few of the dwarfish or shrubby willows. Of the order Coniferæ, we find the *Pinus strobus*, white pine; *P. rigida*, pitch pine; *P. canadensis*, hemlock; *P. balsamea*, fir; *P. alba*, single spruce; *P. nigra*, black spruce; *P. fraseri*, Fraser's pine, on Saddle mountain or Graylock; *P. pendula*, hackmatack; and *P. resinosa*, yellow pine: the two junipers, also, grow upon the dry hill-sides. Of the Amentaceæ, there are four native poplars; six birches, comprising the white birch of the mountains, the yellow and the black birch of the ordinary hill-sides and forests, and the *glandulosa*, a shrub of the swamps; the chestnut, whose station is upon the moderately high ridges; the beech of the plains and hills; the buttonwood on the banks of streams; and eight or ten species of oak: black, white, red, chestnut, shrub, quercitron and post oaks. We have also two elms (the american and the slippery), and five maples: the elms occupy the low lands; two of the maples occupy the plains and lower hills, and the mountain and striped maples are found upon the mountain sides.

In this region we find about eighty grasses belonging to the order Gramineæ, or true grasses; and over one hundred of the order Cyperaceæ, or cypress-like grasses, being the coarse grasses of the swamps.

It does not appear that the distribution of plants in this region is influenced by the kind of rock which has furnished the subsoil, with the exception of a few instances in which a limestone basis seems to have produced spots congenial to a peculiar growth.

FACE OF THE COUNTRY.

All that is peculiar to the surface of this region, may be described in a few words. It is, in the first place, hilly, and the hills are long towards the more mountainous parts, and run north and south. Towards the western slope, adjacent to the valley of the Hudson, they are more rounded, like haycocks, and rise up from circular depressions, many of which are peat swamps with marl, and always contain more or less muck. The hills are frequently composed of rounded gravel, but sometimes of that kind called flat gravel. Upon the extreme eastern border, the hills are highly charged with cobblestone, derived form the granular quartz. Cobblestone almost as durable, of a reddish kind, occurs in the western hills, derived from the Potsdam sandstone and a siliceous variety of the Calciferous sandstone.

The hills under consideration are those usually called "drift hills;" that is, they were formed by the great northern current of water which passed over this country at a former epoch. The time when this event happened is not determined, only it was one of the latest of the great changes which have happened, and which were preparatory for the residence of man. We regard the drift current, then, as having given shape to this country; as having worn down all the asperities of the rocks; as having mingled the soils from the different rocks; in fine, as having performed in these respects most essential changes of the surface, and such as were well calculated to favor the operations of the husbandman.

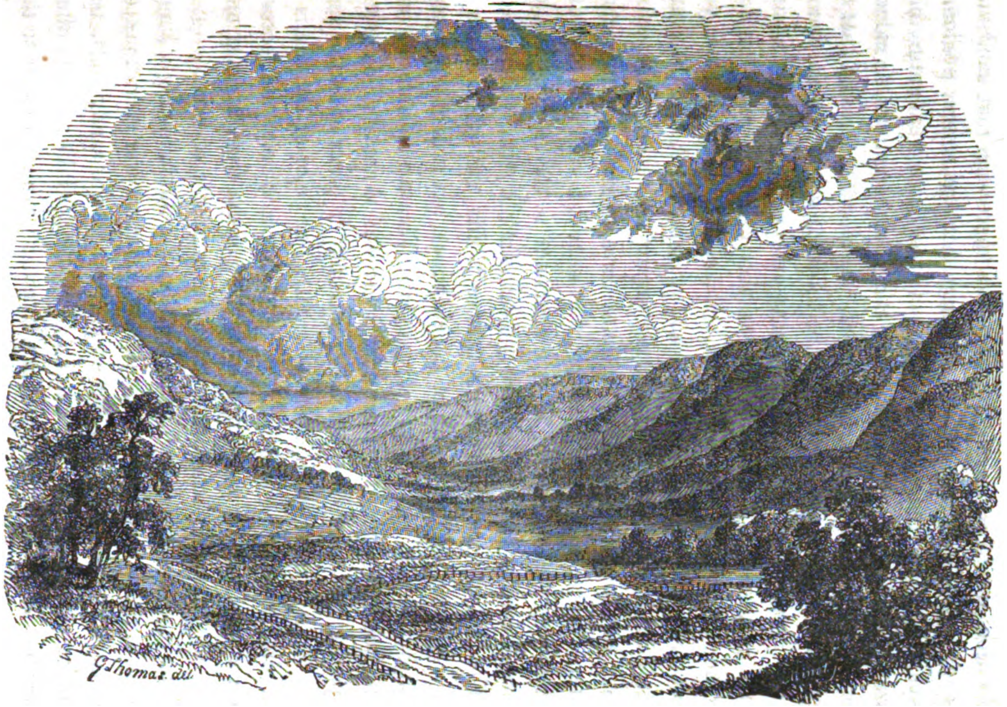
The actual elevation of some places will convey to the reader a better idea of this region, than if we confined ourselves to general statements. Along the eastern margin of the region, in Massachusetts, we have the following elevations, namely: Bed of the Hoosic river at Williamstown, 580 feet; Adams village, 764; Lenox village, 1178; Pittsfield, 1035; Richmond, 1091; all estimated above tide at Albany. Sheffield rises 630 feet above tide water at Derby in Connecticut. The elevation of the Taconic range, between New-York and Massachusetts, is from 1200 to 1600 feet. From this height, the Taconic range gradually diminishes to the level of the Hudson. The hills are less and less elevated till we reach the vicinity of the river, which is bordered or edged by a range of hills about 200 to 250 feet in height. This elevated ridge is found on both sides of the river, and is distant from it three-fourths of a mile or less, so that the width of the immediate valley of the Hudson rarely exceeds two miles. Without occupying more space in detailing the facts relative to height, we may state generally, that along the same ranges north and south, the height of the places given is an index to those which are omitted; that is, the valleys situated north or south of Hoosic, the height of which has been given at certain places, will give the approximate heights of places in the same range north and south for the valleys or for the mountain ridges; and to form a just idea of the face of the country, we have only to conceive long narrow valleys bounded by long narrow hills or mountains. The northwestern slope, where the rock appears, is always steeper than the southeastern. Where the hills are merely of drift, they are steepest upon their north sides.

The upper half of the Taconic range is too steep for the plough, especially on its western side; but on the eastern side, it is, or may be ploughed for two-thirds the distance to the tops of the mountains. This peculiarity in the steepness is owing to the uplift of the rocks, which break out, and are bare, or more or less exposed upon their steep sides; and it is here that their dip will be found, and that they may be seen to plunge steeply to the southeast at an angle varying from 30 to 60°.

The passage of the drift over the surface of the rock has worn it smooth. This circumstance has an important bearing in determining the condition of the soil, as it favors the passage of water over the surface, and serves to dry the soil sooner than if it were rough. Especially are the channels which are cut by the drift movement upon the upturned edges of the slate, calculated to effect a speedy drainage.

We conclude our remarks on the face of the country, by referring the reader to the woodcut fig. 1. It represents the eastern face of the Taconic range, as seen from the south end of Stonehill in Williamstown, Massachusetts, and looking southwest.

Fig. 1.


G. Thomas. del.

Taconic range of mountains.

SOILS OF THE TACONIC REGION.

We have already estimated this as forming one botanical region: so too we may say of the soil, that it is but one, and similarly constituted throughout the district under consideration. By this generalization, we do not mean to convey the impression that sand and clay and other elements are so mixed together that neither predominates throughout the whole region, and that there is an entire uniformity of soil; but we intend to say, that if any one town, or indeed almost any part of a town, is selected, its soil will represent that of any other town in the region; or the kinds of soil which are found in any given place, are also common to other places. Then, again, the adaptations as a whole are remarkably similar: or, to employ another comparison, the rocks, for instance, are mostly slates, yet there are small belts of limestone and of sandstone; but these are so inferior in extent that they do not impart a predominating character to the system, while the slates have a predominating character. So we may say of the soil, that although sand and clay are found, they are too limited to give character to the region. We of course leave out of view the clays and sands of the tertiary formation.

The first character we have to notice, is that the soil is a *coarse soil:* it is not only often full of cobblestones, but it is of a coarser grain by far than the western wheat soils. This we consider as one of its best characters: it admits air freely, and is not at all disposed to pack. We never see rain water standing in pools upon the surface, but it invariably sinks out of sight. The color of the soil is a light drab, darker when moist; the lightest colored being the poorest. As a whole, the soil is a proper admixture of the elements clay and sand, the former in combination with the protoxide of iron.

The local distinctions which are made, are the following: First, clayey soils, which occupy the vallies and the lower elevations, or the bases of the hills; and secondly, gravelly and sandy soils, occupying also the vallies, but more commonly the hills: clay is often beneath. The clayey soil has not the tenacity which belongs to the plastic clays; that is, it does not adhere with a death grasp to one's boots or shoes: it is usually a sandy clay. Where the clay is deep beneath the surface, the soil is inclined to be leachy, though rarely immoderately so, and there is scarcely a patch of this description which may not be cured of this infirmity. The kind of soils termed alluvial, are confined to the banks of streams, and are necessarily narrow, in fact mere lines. It is extremely rare that intervale land extends a mile from the banks of the river on which it is situated: this is even true of the Champlain and Hudson vallies.

Analyses of soils.

1. We select one from Columbia county: it is of a light gray, and was taken from a field of corn in Chatham 4-corners. The corn was in a flourishing condition, and had been lightly manured with stable manure. The soil was composed of

Water	5·00
Vegetable matter	6·00
Silex	78·50
Peroxide of iron	6·25
Alumina	3·50
Carbonate of lime	0·66
Phosphate of magnesia	0·16
	100·07

2. A specimen of soil from over an impure limestone in Hoosic falls: texture coarse, with angular grains, reddish and uncultivated.

Vegetable matter	5·00
Water	3·00
Silex	78·00
Peroxide of iron	8·50
Alumina	4·00
Carbonate of lime	1·40
Phosphate of magnesia	0·10
	100·00

3. A soil from Sheffield, on the eastern side of the Taconic range, analyzed by Pres. Hitchcock, by the alkaline method; the result, however, does not differ in the main from that given by the acid method.

Water	2·00
Vegetable matter	2·00
Silica	70·68
Alumina	11·61
Oxide of iron	10·10
Lime	0·80
Magnesia	1·63
Soluble salts	0·15
Loss	1·03
	100·02

4. A peculiar calcareous soil of Berkshire was found by Pres. Hitchcock to be constituted thus :

Water - - - - - - - - -	3·80
Soluble geine - - - - - - -	0·93
Insoluble geine - - - - -	1·90
Carbonate of lime - - - -	30·57
Sulphate of lime - - - - -	1·40
Phosphate of lime - - - -	1·03
Lime - - - - - - - - - -	0·09
Silica - - - - - - - - - -	46·43
Alumina - - - - - - -	6·82
Peroxide of iron - - - - -	4·01
Magnesia - - - - - - -	1·03
Loss - - - - - - - - - -	1·30
	100·00

But this soil is rare, and is only found in the immediate vicinity of a decomposing limerock. We give it for the purpose of showing the excess of lime it contains. It is a very fertile kind of soil, and might even be advantageously employed as a manure on the adjacent and poorer portions of land. Its color is red. We have observed that soils of a reddish cast, when occurring near a limestone, are always fertile ; and Pres. Hitchcock supposes, that as the iron was originally in the state of a carbonate, it furnishes carbonic acid to the growing plants during its own conversion into an oxide.

5. Analysis of the marly clays of Berkshire and Williamstown, by Pres. Hitchcock :

Silex - - - - - - - - - -	60·24
Alumina - - - - - - - -	15·53
Protoxide of iron - - - - -	7·57
Carbonate of lime - - - -	11·70
Magnesia - - - - - - -	1·86
Water - - - - - - - - -	2·30
Loss - - - - - - - - - -	0·80
	100·00

6. Another analysis by the same author, of a specimen of marl from Pittsfield :

Geine - - - - - - - - -	6·60
Phosphate of lime - - - -	0·70
Carbonate of lime - - - -	86·40
Carbonate of magnesia - - -	0·46
Silex - - - - - - - - - -	3·10
Water - - - - - - - - -	3·00
	100·26

7. We give one more analysis, being that of a soil from Rensselaer county : color brownish drab, and texture coarse.

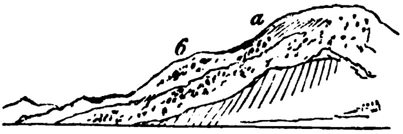
Water - - - - - - - - -	2·50
Vegetable matter - - - - -	4·00
Silex - - - - - - - - - -	80·00
Alumina - - - - - - - -	4·00
Peroxide of iron - - - - -	4·00
Phosphate of magnesia - - -	3·00
Carbonate of lime - - - -	2·00
	99·50

We have selected the foregoing analyses out of many which we have on hand, for the purpose of showing that although limestone exists abundantly in our district, it is contained only in small proportion in the surface soil, while we find magnesia in almost every specimen. This last is an important element, and we consider its presence as explaining why this region is so well adapted to the raising of maize or indian corn. Phosphate of magnesia, it is now known, enters into the composition of this grain; and it is highly probable that, where this substance is deficient, corn does not reach perfection.

An improvement proposed.

This consists in deep draining. We have observed many farms, with an acre situated as represented in the following diagram :

Fig. 2.



At *a* is a hardpan (with the soil upon it), say eighteen inches below the surface, and the slope extending towards *b*. Lands thus situated, and based upon a hardpan or stiff clay subsoil, will be invariably too wet. At *a*, springs frequently gush out; and the whole slope, though well exposed, will be inclined to produce the poorer grasses, and to become mossy; and although no water appears on the surface, yet it subsides so slowly that the temperature is always low. The only remedy in such cases is deep draining. Places of this description are so numerous in the Taconic region, on both sides of the range, that it appeared proper to call attention to the subject.

AGRICULTURAL PRODUCTIONS, AND MODES OF CULTIVATION.

All the ordinary cultivated vegetables grow well here; but we will first speak of maize. The seed is generally planted by the middle of May. The best farmers prefer, and we think with reason, to get the crop planted as soon as possible in the spring; for should a frost nip the young leaves, the plants will be retarded a little, but will grow and spread their roots beneath the soil, though they may apparently make but little progress at first. Some say, however, that you had better wait till the weather is warm, and frosts no longer threaten; for they have seen late-planted corn spring up at once, and overtake the early planted which has borne the buffetings of a squally spring. Yet the soundness of this course does not appear; for the early planted corn is also the earliest in ripening, and stands the best chance to escape early frosts in autumn, which is a matter of far greater consequence; besides, it is not so liable to be injured by drought. Let it then be planted as early as possible, that it may escape the frosts of September, and also so shade the ground in July that it may protect itself from drought. Whoever observes, will find that the months of July and August make or unmake the crop of corn; that however untoward the weather of June may be, if only that of July and August are favorable, corn will ripen. Some farmers, if not most of them, plant their corn on sward which has been ploughed up the preceding fall. If the soil is rather sandy, the furrow is turned flat, and afterwards harrowed only lightly, so as not to break in upon the furrow: this mode stands drought better than if the furrow be oblique. Before planting, it is customary to wet the seed and roll it in plaster (this is an old method); and then afterward, say at the first hoeing, apply a table spoonful of plaster to each hill. Ashes are in high esteem: a single handful, cast around the hill of corn just before rain, produces great effects. It is agreed by all farmers, too, that the soil must be stirred, hoed or harrowed; nevertheless great care is requisite in these operations not to disturb the roots. The best farmers cut up the whole hill, in harvesting corn, with a sickle. This operation, near the Hudson river, is performed about the tenth of September. By this mode, more fodder is saved for milch cows. It has become an established rule now, in selecting seed corn, to select the first that is ripe.

Winter rye. This crop is not raised in large quantities for food. Our best farmers prefer sowing it early in September. We have known it to be sowed in January with success. When raised upon the uplands or the sandy hill-side, it yields better flour than that furnished by the crops of the lowlands. Two opinions prevail as to the time of cutting this grain. One class say that it should be cut while the joints are green; the others that it should not be cut until fully ripe and dry.

Winter wheat, in a large part of this district, has not been much cultivated for many years, on account of the insect (*Cecidomya*). This year, more wheat has been raised than usual; sufficient, it is supposed, in many towns of Berkshire in Massachusetts, for the farmer's home supply. This also is the case in many of the towns west of the Taconic range.

Barley. The country best adapted to the growth of barley, is the range of hills west of the Taconic range: they are considerably less elevated; the soil is always coarse, and the climate cool. The soil is generally what is termed a yellow loam, with a hardpan about eighteen inches below the surface. The towns celebrated for this crop, are Sandlake, Grafton, Berlin and Stephentown; and in this range, north and south, the same conditions exist which would ensure a successful cultivation of this grain.

Flax. This is cultivated successfully upon what may be termed the hard and coarse soils at the base of the Taconic range, at an elevation of 1000 feet above the tide at Albany. It is sown about the twentieth of April: twenty-eight quarts of seed to the acre is sufficient. Ashes is considered the best manure, and is sown upon the field just as the flax is coming up. Over 380 lbs. of flax have been raised to the acre on this elevated land. When the seed is filled out, or plump, it may be pulled: if not quite ripe, it perfects itself in the swarth.

Oats, succeed well on all the hills of the Taconic system. It is sown about the fifteenth of April; the land to be twice ploughed, and well harrowed. It requires a hardpan to succeed well. It will probably grow and ripen in these hills, 3000 feet above tide at Albany.

Peas. This sure crop, and excellent one for fattening hogs or feeding in the summer, is discontinued by some farmers on account of the bug. Some, however, sow late, say the tenth of June, and escape that insect. Peas are said to be the best crop to precede wheat. The advantage of this crop is that it grows and ripens in mountainous regions, or one subject to frost, and hence may be a substitute (together with oats) for corn in fattening swine and feeding horses. They grow well in Hamilton county and the western part of Essex in New-York, 2000 feet above tide.

Potatoes. This crop, too, is adapted to the hard coarse soils of the Taconic range.

Clover and grass. The wide range which clover and the grasses admit of, adapt them to all climates. Probably, however, no better field for grass and hay exists in New-York and New-England, than upon the country between the Hudson river and the top of the Green mountains. In seeding down, but two kinds are used, timothy and the red clover seed : these are frequently mixed and sown together. Moist still weather is a proper condition for sowing. The quantity varies with different farmers : some use eight, others go up to fifteen or sixteen quarts of the mixed seed to the acre. The quality of the crop is undoubtedly varied by the quantity of seed sown : sixteen quarts to the acre would grow thick and fine, and ensure a greater certainty of covering the ground with a turf or sward, which is a matter of some consequence. Some sow only four quarts to the acre. The nature of the soil must be taken into consideration in determining the quantity to be sown.

In conclusion, we would say that the counties enumerated are eminently adapted to the growth and perfection of maize, in most situations from the Hudson valley to an elevation of about 1000 feet on the Green mountains. Above this elevation, frosts interfere, and the ears of corn do not fill out perfectly. Barley, peas and oats may be cultivated in still higher situations, and may be used as a substitute in feeding cattle, swine and sheep. This region is also well adapted to the grasses, and good hay will always find a market. The hay of the Hudson valley is preferred by dealers at the eastward, although some improvement might still be made in the manner of curing and pressing it.

THE LOST RACES.

IT will not be denied, we presume, that the extinction of entire races of animals is a subject of great interest to man; that it is a phenomenon well calculated to excite inquiry. It is a circumstance, too, which seems to be of some consequence to us personally: not that any immediate danger, on this score, need be apprehended for our own personal safety and well-being; but it is of such a nature as to lead us to reflection and inquiry in regard to the mode of operation of those influences which have resulted in such extinction. We do not here refer to the extinction of the lower orders of beings, the mollusca and crustacea; but to that of the higher orders, those warm-blooded terrestrial animals which rank in the animal scale next to man. Shall we not inquire, then, since the higher animals have perished by families, and entire races have become extinct at a very recent period, May not the same influences which operated in the case of the warm-blooded terrestrial animals, operate also on man as a race, in such a degree as to terminate his career upon the earth? These lost races, whose remains lie buried in the most recent beds, at the very surface of the ground which is ploughed and sowed by the hand of man, breathed the same atmosphere that we do, basked in the same sunlight, drank of the rains of heaven, and partook like ourselves in many of the commoner-pleasures of life; yet, through the influence of physical agents, entire species have passed away; and had not their bones been durable, their former existence would never have been suspected.

Can we assign a cause for this catastrophe? Was it a sudden tempest that swept over the ancient hills, and laid in one common ruin all that then had existence? Was it an overwhelming flood that poured forth the fury of its waters, and drowned the animals quietly grazing on the plains and hillsides? Or did an earthquake rock the earth and tear up its foundations; swallowing a part of the living races, and destroying others by noxious vapors emitted from the suddenly opened caverns? Or did some slow and subtle poison diffuse itself through the living frame, begetting a sluggish motion of the blood, destroying the elasticity of the muscles, and gradually enfeebling the external senses, till finally the body became an easy prey to the elements, and the last individual of the race sank down and perished? Towards the solution of these inquiries, we have no evidence save that of analogy. Life begins at a point; radiates from that point; gathers strength and power in its progress, till it reaches its acme; then begins to faulter, till finally it turns backward, runs a retrograde course, and terminates, as it began, in a point. Species commence their course in a single pair of individuals: they multiply and increase, until the race attains its maximum of development in numbers and physical perfection; when a stationary period intervenes, and is succeeded by one of decline; the life-power of the species slowly retires, exhausted of its force by its diffusion through the great flood of beings which it has served to animate, till finally becoming too dilute and feeble to sustain the vital energy, it lingers for a moment like the flickering and dim light of an expiring taper, and then disappears forever. Nations too arise from a few individuals, or from a feeble colony, a score of men perhaps: they press onward and become a strong people; they extend their power on all sides, and every successive step serves but to increase the national strength and prosperity, until that strength and prosperity reach their highest limit; when, as it were in the fulfilment of a law of nature, an inevitable decline commences; the centre of the body politic gradually loses its power over the circumferential members; its efforts to supply vitality to the extremes exhaust itself, and it falls sooner or later a prey to its own weakness.

We see this principle illustrated, as we think, in the lost races themselves. How often is the geologist able to point to the very origin of a race; not perhaps to the first progenitor, but to the time when, like a feeble colony, it began its career in a score of individuals only. From such small beginnings, for instance, arose the numerous species which have successively tenanted the ancient waters of our planet: they grew and increased in numbers, till they filled the depths of the sea, and spread themselves on every shore; but though possessing this wide domain, they were not destined to hold it forever: in numbers, and in perfection of specific development, they reached the limit assigned by nature, and thence began in their turn a downward course, dwindled away to a feeble and imperfect condition, decreased in numbers, and finally perished, never to appear again on this sphere of existence. Recent discoveries corroborate the soundness of these views. We observe, perhaps for the first time, a single mollusk at the base of the New-York system of rocks. As the deposits of this system are piled one upon another, this mollusk increases in numbers with every additional ascending deposit, and, before the middle of the series is reached, has spread so widely, and so countlessly multiplied itself that it nearly fills the mass of the rock. From this point upwards, however, no increase, but a diminution in the numbers of this same mollusk occurs with each succeeding deposit, till a few solitary individuals only remain. The relation here stated holds true for both the vertical and the horizontal plane, in all the extent of the system of the New-York deposits : go east or west, we find always the same order of increase, decrease, and final extinction of the species.

We have expended many words in attempting to convey a single idea, to exhibit a single fact, which, after all, may be condensed in the three words that serve to define a well-known character employed in musical notation : *crescendo et diminuendo* <>. With this harmonical symbol before us, our whole idea is comprised in a diagram ; the complete progress and final close of the march led by each earthborn race is expressed in a formula.

We have been led into the foregoing train of thought, by the discovery of the remains of a species of deer in the freshwater marl beds of Orange and Greene counties in this State. We first obtained the jaw of this extinct species from the marl pit of Mr. Stewart in the latter county, and afterwards one of the horns from a similar pit in Scotchtown in Orange. This deer was about the size of the reindeer of the north, and, like that animal, was provided with a flattened (though more slender) horn ; but it differs specifically from the reindeer, in the possession of two brow antlers instead of one, on a single shaft, and quite near its base. No other bones have yet been found, and hence the height and bulk of the animal have not been accurately determined ; but that in this country the genus CERVUS contained a species which is now extinct, is, by this discovery, placed beyond a doubt.

But a still more remarkable species has also perished : we allude to the great Irish elk, whose remains are found in the same beds as those of the deer just spoken of. The horns of this gigantic creature had a spread of ten feet, and hence he must have been one of the most majestic animals of the forests of his time.

Of all the species of extinct quadrupeds, however, the mastodons and elephants are the most remarkable. An animal twelve feet high and proportionately long, provided with tusks curving upwards and outwards to the extent of ten feet, must have been a unique object upon the hills in our vicinity. What their habits were, cannot be well determined now; but we know that they must have been vegetable feeders, and have browsed upon trees of no mean height and size. A circumstance of some interest in their history is, that they appear to have been confined to the western side of the present valley of the Hudson; for so far as observations have been made, their remains have not been found either north of the Mohawk valley, or east of the Hudson river. Although the bones belonging to many different individuals have been discovered in the counties of Albany and Greene in this State, and in the adjacent counties in New-Jersey, still this part of the continent does not appear to have been their favorite haunt. We must go into the valley of the Mississippi, if we would form a true conception of their former numbers and importance. The Bigbone licks are known the world over, as the cemetery of hundreds of these animals. But here they are not solitary and alone: numerous bones of other animals, known now to be extinct, lie entombed with them in those saline deposits. The horse, the ox, the buffalo, and some others, appear to have been their companions, and to have made these spots a favorite resort. Still farther west, they were equally if not more abundant. Not long ago, a collection of bones was brought from the Mississippi valley, which must have appertained to more than five hundred individuals, comprising those of all ages, the young, the mature, and the old. The Helderberg hills seem to have been the limit of their wanderings in this direction, the base of the Rocky mountains their extreme west, and the valley of the Mississippi the centre of their range.

The most interesting question in regard to these animals, is that which inquires the cause of their extinction. On this question we are not prepared to sustain an opinion, nor even to offer one that is any thing like satisfactory to ourselves. If we recur to the flood of Noah, we are by no means authorised to believe that we have assigned the true cause; though, upon a superficial view, that catastrophe seems to offer a plausible solution. The investigations of geologists show that many deluges have occurred, at different times and on different portions of the earth's surface. The subject, however, is one that is still in a course of investigation: time will unfold her secrets; and we are persuaded that facts bearing directly upon these points will yet be disclosed, which shall reveal to us the whole mystery of the lost races.

GREAT AMERICAN MASTODON.

In the month of August, 1845, whilst excavating marl on the farm of Nathaniel Brewster, Esq., six miles west of the village of Newburgh, Orange county, N. Y., the workmen struck upon the skull of a Mastodon. The work was carefully conducted, and at the close of the second day they had succeeded in exhuming the entire skeleton, with the exception of the toes of one foot, which were probably carried out with the marl. This is the most entire skeleton of this remarkable animal ever found. The bones are in a singularly perfect state of preservation, retaining still a large portion of animal matter even in the spongy portions. The skeleton has since been arranged and set up, and this has been done with great care and the strictest attention to the articulating surfaces of all the bones, which we believe has not been the case with others which have been put together. Such we believe to be the fact from the drawings we have seen of the one arranged by Mr. Peale, and from the description given to us of others which we have had no opportunity of seeing. The amount of cartilage to be supplied between the vertebræ has been misconceived, and thus the back has been made much longer than in the living animal. In the present instance, a perfect gage was furnished by two ribs, which, during the life of the animal, had become united longitudinally. Each one of these ribs articulated with a verteber; and in bringing these articulating surfaces together, the exact amount of intervertebral space was found. This, in connection with the ribs which articulated with two vertebræ, determined the amount to be supplied; and thus the back of this skeleton is said to be from two to three feet shorter than those which have been made according to the fancy of the owners. The intervertebral substance is only half an inch in thickness.

As the discovery of this singularly perfect skeleton of an extinct race of animals has excited a very extensive curiosity, it may be interesting to many to have a particular description of the condition in which it was found. Portions of twelve skeletons of the same animal have been discovered in the same county within the present century; but in no case have bones enough been found to give a full idea of the structure and character of the animal, and in almost all cases the bones have been in an advanced stage of decomposition.

Locality and position. Like all others found in this vicinity, this was buried in a peat-swamp, but, in this case, of very small dimensions. The whole peat formation here is only four hundred feet long and one hundred and twelve wide, lying between two low ridges of slate hills, the whole valley being about two hundred feet wide. The clay which underlies the peat bog, descends gradually from both sides, and once formed the bottom of the small pond which occupied this spot. It slopes down very gradually till within six feet of where the bones were found, in which spot it is but six feet below the surface. At this point, however, it makes a sudden descent, and the bottom cannot be reached by sounding with an iron rod.

Beginning at the bottom, then, the following are the deposites which have gradually formed and filled up the pond :

1. Mud, more than 10 feet.
2. Shell marl, 3 feet.
3. A layer of red moss, 1 foot.
4. Peat, 2 feet.

Just below No. 3, in the top of the marl, and barely covered by it, lay the skeleton. The direction of the backbone was north and south. The head was thrown crosswise, so that the tusks pointed nearly to the west. Every bone occupied nearly the position it did when the animal was alive. The back of the skeleton was upward; each of the vertebræ in place, from the first of the neck to the last of the loins. The ribs were projected downwards on each side. The head was upon the top of the neck, and the lower jaw slipped a few inches to one side. The hindlegs were spread out on each side, each bone in its place to the very feet. The whole position was precisely that of an animal that had become mired, and perished in its ineffectual struggles to extricate itself, and it had doubtless died in the place where its bones were found.

In the midst of the ribs, imbedded in the marl and unmixed with shells or carbonate of lime, was a mass of matter composed principally of the twigs of trees broken into pieces of about two inches in length, and varying in size from very small twigs to half an inch in diameter. There was mixed with these a large quantity of finer vegetable substance like finely divided leaves, the whole amounting to from four to six bushels. From the appearance of this, and its situation, it was supposed to be the contents of the stomach; and this opinion was confirmed upon removing the pelvis, underneath which, in the direction of the last of the intestines, was a train of the same material about three feet in length and four inches in diameter. This was composed almost entirely of the twigs, some of them not even crushed, and retaining still the form and structure of the tree from which they were torn.

This is by no means a solitary instance of the discovery of this matter. The same has been found in connection with other skeletons. In Godman's Natural History, under the article Mastodon, is recorded an instance of the same kind, and the species of plant found was detected. He thus quotes from a letter of Dr. Barton : "Very lately, in digging a well near a saltlick in the county of Wythe in Virginia, after penetrating about five feet below the surface of the soil, the workmen struck upon the stomach of one of those huge animals best known in the United States by the name of *Mammoth*. The contents of the viscus were carefully examined, and were found to be in a state of perfect preservation. They consisted of half masticated reeds (a species of *Arundo* or *Arundinaria*, still common in Virginia and other parts of the United States), of twigs of trees, and of grass or leaves."

A good deal of doubt existed at the time and afterwards, as to the character of the substance ; but in the case we have now before us, there can be no doubt. The appearance of the matter, and the peculiar position in which it was found, are unquestionable evidence of its being what it was supposed to be, the food which the animal had eaten.

History of the animal. As far as is known at present, the whole race of mastodons is extinct. There is no evidence of their existence at this day. But the numerous remains of them found in this country, indicate that they have at some period lived in great numbers on this continent. At what time this was, we shall consider hereafter. Their range, however, does not appear to have extended over the whole of North America, but to have been confined mostly to the rich alluvial vallies. Portions of two skeletons only have been found north of Orange county in the State of New-York. East of the Hudson river, portions of two have been discovered. Orange county, however, seems to have been the northern limit of their range, and the Hudson river the eastern boundary. Passing then south through New-Jersey, and thence westward through all the great western vallies, throughout this whole region the bones are found in greater or less abundance. The saltlicks of Kentucky have furnished the most of these remains; and it has been stated, that from one of these localities alone, portions of more than one hundred skeletons have been removed. This species of mastodon is peculiar to this continent, no remains of it having been found in any other portion of the globe.

The first bones and teeth of this animal were found as early as 1712, at Albany; and were noticed in the Philosophical Transactions, in a letter from Dr. Mather to Dr. Woodward. In 1739, a French officer, by the name of Longueil, discovered some of the bones, teeth and tusks, near the Ohio river; and the next year, large quantities of similar bones were washed up by the current of the same river. After this time the bones were occasionally found, down to the present, but often very much decayed, and never in sufficient quantities to make an entire skeleton. The scientific world is much indebted to the late Mr. Peale, who, with great labor and at much expense, procured, in 1800, sufficient bones to enable him to construct a tolerably complete skeleton, which is now in the Philadelphia Museum.

But though the living animal is unknown to us, the aboriginal inhabitants of this country seem to have been well acquainted with him. Many people are disposed to place very little dependence upon Indian tradition; but however vague such tradition may become in relation to particular facts, by long transmission from generation to generation, yet it must have something real and true for its origin. Such we believe to be the fact in relation to this animal. We shall, therefore, give a few of these traditions as concisely as possible.

In President Jefferson's Notes on Virginia, we find the following tradition of the Indians, in relation to this animal:

"That in ancient times a herd of these tremendous animals came to the Big Bone Lick, and began a universal destruction of the bear, deer, elk, buffaloes, and other animals, which had been created for the use of the Indians.

"And that the Great Man above, looking down, and seeing this, was so enraged, that he seized his lightning, descended on the earth, and seated himself on a neighboring mountain, on a certain mountain rock, where the print of his feet are still remaining, from whence he hurled his bolts among them, till the whole were slaughtered except the big bull, who, presenting his forehead to the shafts, shook them off as they fell, but at length, one of them missing his head, glanced on his side, wounding him sufficiently to make him mad; whereon springing round, he bounded over the Ohio at a leap, then over the Wabash at another, the Illinois at a third, and a fourth leap over the great lakes, where he is living at this day."

A Mr. Stanley, who was taken prisoner by the Indians, and carried beyond the western mountains to where a river runs westward, says that these bones abound there, "and that the natives described to him the animal to which these belonged, as still living in the northern parts of their country."

The following we extract from Dr. Kock's pamphlet on the Missourium[*]: "One man, in 1816, has asserted that his grandfather told him he saw one of these animals in a mountain pass when he was hunting; and that on hearing its roar, which he compared to thunder, the sight almost left his eyes, and that his heart became as small as an infant's."

Period of their existence. The opinion is a very prevalent one, that these animals were antediluvian, and most persons reject with a sneer the idea that they have lived at a very recent period. But the first opinion has no shadow of ground for belief, and all the evidence seems to show that they have existed not many centuries since.

Mr. Jefferson, in his Notes on Virginia, reasons thus: "It may be asked why I insert the mammoth as if it still existed? I ask, in return, why I should omit it as if it did not exist? The northern and western parts still remain in their aboriginal state, unexplored and undisturbed by us, or by others for us. He may as well exist there now as he did formerly, where we find his bones, &c." The same reasoning which he used, will apply, with a diminished force it is true, to our own times. There are still vast portions of this continent yet unexplored by the white man, and inhabited only by hostile Indian tribes. Vast gorges of the mountains in the west might still contain the living animal, and yet we be utterly ignorant of his existence. But we will not contend for his present existence. We will examine briefly the evidence of his having lived within a very few centuries.

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[*] Doct. Kock discovered, in 1840, the remains of the animal which he has called *Missourium theristocaulodon*, in the Osage country. The grounds upon which he has given it a new name appear to be very questionable, and are by no means sufficient to make it any thing more than the Mastodon, the remains of which are so often found even as far west as Missouri, any more than to make the *Hydrarchos* from the *Zeuglodon* described in our last number.

In the first place, the testimony of the Indians, but a few years back. They stated in the early part of this century, that this animal still lived north of the Missouri river. They called it "Pere du bœufs" (father of cattle). But how shall we reply to the question, if the animal has lived in these parts of the country within so short a time, why did not the early white settlers either see them or hear of them from the Indians? To this we answer, that after the discovery of this country, the settlements of it took place very slowly, and then was principally in those parts which have not apparently been in the track of the mastodons. That they did not hear of them from the Indians is not wonderful, for there was nothing to excite enquiry with regard to them. If a bone of one had been found at that period, and thus enquiry started, doubtless something would have been ascertained far more distinctly than has since been learned.

That they were not antediluvian, is settled by the fact of their being found in a deposit of marl and peat, all of which has been formed in modern times, and which is still forming.* Moreover the fact that the bones in this skeleton, from Orange county, are so fresh, containing a large portion of animal matter, and that the contents of the stomach and intestines were found unchanged apparently by time, is strong evidence that this individual has lived at a very recent period, and we may put down five hundred years ago as the most distant time at which he lived; and we are strongly inclined to the opinion, that if extinct now, they have not been extinct one hundred years in the western parts of this country.

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* The rapidity with which this peaty formation is deposited, may be inferred from the following fact. Forty years ago, an excavation for marl was made seven feet deep, within twenty feet of the spot where these bones were found. By the operation of the ordinary natural causes, that pit is now filled to nearly the level of the surrounding surface. The deposit must have been much more rapid, at the time that the peat here was first formed, when every year large quantities of leaves were accumulated in it, besides the rank vegetation which annually grew and decayed there.

It is a curious fact, also, that after these marl pits become filled with water, though unconnected with any stream or pond of water, they in a few years become stocked with eels, catfish and sunfish.

ANATOMY OF THE MASTODON.

The skull. The bones of the skull are wonderfully large, and as well preserved as the other bones. The posterior part is flat and broad, measuring in height one foot eleven inches, and in width two feet nine inches. The *foramen magnum* for the passage of the spinal marrow, is three inches and a half in diameter. In the centre of the occipital bone are two deep cavities for the insertion of the *ligamentum nuchæ*, separated by a thin bony partition. The frontal bone is two feet four inches wide, between the orbits of the eyes. The outer plate of bone is very hard and three quarters of an inch thick, where we find eleven inches and a quarter of cellular bone, extending down to the brain. The cavity of the brain is small, occupying only the lower portion of the skull. In front of the nares (nostrils), between the origin of the tusks, is a cavity as large as that of the brain, and is probably the *antrum highmorianum.*

The insertion of the tusks into the intermaxillary bones, is two feet five inches, extending quite back of the orbits. These tusks were ten and a half feet in length, and two feet and an inch in circumference where they enter the socket. With regard to the direction of the tusks, we are convinced from observation of a number of skulls, that their direction is as accidental as the horns of cattle. Some follow the first curve, downward and outwards, the points in one which we have seen being eleven feet asunder. In the skull of this skeleton before us, they first curved downwards and outwards till they were seven feet apart, when they curved inwards and slightly upwards till they approached at the points within two feet of each other. The socket of the tusks is curved and flattened so that it was impossible for the tusks to have turned in the sockets, during the decay of the soft parts, as is supposed by many to have been the case.

The whole skull, lengthwise, is bounded on all sides by nearly straight lines. The lower jaw is nearly straight from the angle to the front, and measures in that line two feet ten inches. The condyloid process by which it is articulated with the head, is distant from the coronoid process one foot. In the front of the lower jaw, at the commissure, is a small round tooth, eleven inches in length and one inch and a half in diameter, and inserted into a socket seven inches deep. This is on the left side of the commissure. On the right side is a partial socket, as if another tooth had once been there. It appears that the young animals had these two teeth, but lost them at a later period of life, as the remains of the socket only are found in skeletons of old animals.

The teeth are, in this skeleton, two in each row, making eight in all. The front tooth measures three by four and a half inches; the back tooth, three and a half by seven and a half inches. Like the elephant, this animal probably changed its teeth during its growth; at each change, the back teeth crowding forward, till they eventually crowded out the front ones.

The length of the head, from the occiput to the front of the intermaxillary bones, is four feet and one inch, and weighed, with the tusks, 694 pounds.

There are seven bones of the neck, nineteen of the back and three of the loins. The first seven bones of the back are characterized by very long spinous processes, the longest measuring two feet. From the third they diminish in length very rapidly to the eleventh, when they are almost lost. The bones of the neck are much more upright than in the elephant, giving to the animal the appearance of carrying a high head. Atlas, 3 ft. 8 in. in circumference.

The ribs are forty in number; twenty on each side, and the longest measures four feet and seven inches. The first and second ribs on the right side appear to have been broken by some accident during the animal's life. During the process of healing, the first rib has formed a bony attachment to the sternum or breast-bone, which is a triangular bone of large size and one foot seven inches long. The last two ribs on the right side have also been united logitudinally. The scapula (shoulder-blade) is two feet and ten inches long, and two feet and nine inches wide, having a long and sharp acromion process.

The humerus (shoulder) is three feet and five inches long, three feet and two inches in circumferance at the upper end, and three feet and five inches at the lower. The ulna measures two feet and three inches, from the articulation at the humerus, to where it unites with the foot. The olecranon process is seven inches long, and two feet four inches in circumference at the base. The circumference of the elbow is three feet nine inches. The radius is small and slender, and crosses from the inside of the ankle to the front of the elbow. The articulating surface of the elbow is one foot three and a half inches long, and seven and a half inches wide.

The bones of the fore-foot resemble in form those of the elephant, but project forward instead of being arranged in a perpendicular column, and the toes have evidently possessed great power of flexion.

The pelvis is a broad massive bone, and was taken up entire. It measures, between the illiac extremities, six feet and one inch. The pubic and sacro-illiac symphyses are completely united by ossification. The pubic bone, from the anterior to the posterior edge, measures two feet. The thyroid foramen is nine and a half inches long by five inches wide. The diameter from the sacrum to the pubis is twenty-two inches; the transverse diameter nineteen.

The femur (thigh-bone) is three feet ten inches long, and seventeen inches in circumference at the middle. The head of this bone is two feet in circumference; around the trochanter, three feet. The great trochanter is very large, but in place of the lesser trochanter is only a swelling and roughness of the bone.

The tibia is two feet six inches long, and two feet seven inches in circumference at the top. The articulating surface, where it receives the thigh-bone, is one foot transverse diameter. The fibula is two feet two inches in length. The bones of the hind-leg resemble in a wonderful degree the same bones in man; and it is not to be wondered at, that when these bones have been found, they have sometimes been mistaken for the bones of gigantic men.

The bones of the legs, the tusks and the proboscis in this animal are similar to those of the elephant. The structure of the remainder of the skeleton is entirely different. The head of the elephant is formed of bones more or less rounded throughout. The occiput consists of two large lobes of bone, one on each side, with a deep groove between. The lower jaw is convex on the lower side, and teeth in that jaw are with the crowns concave from the front backwards, receiving the upper teeth which are convex to fit them. The teeth of the elephant are nearly smooth, while in this animal they are formed of two rows of conical prominences, from which the animal receives its name, the two Greek words of which the name is composed signifying a *nipple* and a *tooth.*

It was formerly the opinion that this animal lived partly upon flesh. There is, however, satisfactory evidence, from its teeth and from the contents of the stomach, that its food was principally the small twigs and branches of trees. It had little, if any, lateral motion to its lower jaw, and of course could not masticate its food very fine.

All that we know of the habits of the animal is to be inferred from its structure, and tradition. Its form, compared with the elephant, is apparently about the same as the horse compared with the ox. He was probably comparatively a graceful animal in his movements; and with his elevated head, ornamented with such enormous tusks, appeared terribly majestic. The opinion of some that he was the behemoth of Job, is without any foundation; yet the description of that animal in some respects may well apply to this.

EDUCATION OF THE AMERICAN FARMER.

There are many questions which are fully answered when the objects to which they relate are well understood; or if the assertion is too broad, we are at least safe in saying that the way for their solution is then fairly opened. But if the true object sought, is not apprehended, or is but dimly seen, then the chance that we shall obtain a true answer is extremely small. It may seem paradoxical, it is true, for a person to put an inquiry without knowing, himself, the true objects of his inquiry; but this is often the case, and especially so in those questions which relate to education. If then the question should be put, What is the best plan of an education for the American farmer? we say, determine first what the objects of education are, and then you are in a fair way to answer the question. All are agreed on one point, viz. that the standard of education ought to be raised; but there is a disagreement as to the plan, and what branches ought to be taught. One party says that the farmers ought not to be educated at our colleges; for what is there taught is not adapted to meet their wants. It seems to us that the party which thus reasons, or which makes these assertions, labors under a misapprehension in three respects: 1. It misapprehends the object and aim of an academical course of study; 2. It does not clearly see the wants of the pupil; 3. It does not apprehend the end and objects of education in general. Now we take this position: that the young man who designs to be an agriculturalist may be thoroughly and properly educated at our colleges, as they are now organized; or if they are not, in every respect, adapted to meet his wants, they require only a slight change in their arrangements. But let us be understood: we do not take the ground that an agricultural college, such as is contemplated in some quarters, would be useless; but that a course of study, such as is pursued in our colleges, is far better and superior in its adaptation to the wants of the farmer himself, and the interests of the farming population. We have three reasons for this opinion: 1st, The college course of study furnishes more ample means to the pupil, by which he may educate himself; 2d, It supplies his wants; 3d, The objects of education are thereby answered. These reasons, it may be said, run into each other; and so they do: still, each one implies something which the other does not. We shall, however, in illustrating our views, treat them as one under different forms of expression. One remark we would make in this place, viz. that many persons claim to be educated when they have finished their college course: it is a natural, though a very bad mistake, and there is scarcely any thing farther from the truth. It is true that if a man is educated at all, he is self-educated, whether it be at college, or sitting on a bench in the chimney corner and studying by the flaring light of pitch pine knots: it is always a self-education as far as it goes.

To proceed: What does a college course of study do for the pupil; or what is it intended to do? It puts tools into his hands to work with; or perhaps this is too general and too figurative in its expression: we therefore say again, that it puts principles into his head for the better guidance of his talents. To be still more particular, Does he study Latin and Greek? It is not that he may talk Latin or Greek, or even read it in after life; but to learn the construction of language, and the different ways it may be used to persuade and influence men. Does he study mathematics? It is not that he may become a practical mathematician, and spend his days in solving problems in mathematical science; but that he may know the power of numbers and signs in demonstrating truth; that he may acquire a control over the faculty of attention, over the train of thought, and call in, in their true succession, the ideas which link together a demonstration of a proposition, or truths which are to be evolved by a chain of reasoning. Does he study chemistry and natural history? It is not that he may spend his life in the laboratory, working in acids and alkalies; but that he may know the principles which control the composition and decomposition of bodies, the characters which distinguish them, and the uses they subserve in the economy of nature. Does he study astronomy ? It is not that he may become a practical astronomer, and spend his days in viewing the phases of the stars, or in measuring their distances from us ; but that his mind may be enlarged in attempting to comprehend the greatness of the firmament, the vastness of the starry system, and the power of its Creator. But, though we say that it is not the design of the plan of college study to make either of these characters, yet it is possible to make one or the other ; an astrononomer, a chemist, a mathematician or naturalist. We have, however, not yet finished all we intended to say of the objects of a college course of study. Does he study logic ? It is not that he may spend his life in disputation ; but to acquaint himself with the relation of antecedent and consequent, with the mode in which fallacies may be attacked and refuted, with the methods that reason pursues in seeking truth, and with the laws that regulate its movements and give it its greatest strength and power. Does he study moral and mental philosophy ? It is not that he may become professionally a teacher of morals ; but that he may understand the fundamental principles of right and wrong ; that he may know the power which knows, and which actuates the movements of the man. Does he study political economy, or the law of nations ? It is not that he may become a politician by trade, or a jurist or a judge ; but that he may know on what principles our constitutional rights are based, by what bonds our political associations are held together, and what are the usages which control the intercourse of states and nations.

In these reasons we may recognize several great departments of knowledge, in each of which there are some principles that are called into action almost daily.

The first kind is that of language, the great medium of intercourse between man and man, between states and nations ; in fine, the power which controls the world.

The second, is that of numbers and signs, by which the low and the high is measured, and by which the light and the heavy are weighed, ratio expressed, and time and distance computed.

The third kind relates to physics, which takes cognizance of forms, composition, characters general and specific, the mutual or reciprocal actions among bodies; it is in fine related to all that administers to the physical well-being of creatures in life.

The fourth relates to matter and bodies at a distance, but still which has its practical application in navigation and geography, and in fixing the position of places, through which intercourse between states and nations is safely conducted.

The fifth, that which explains the relations of men in their civil and municipal capacity, the foundations of law and justice, and of government.

The sixth, is of mind and the spiritual part of man, that which is emphatically the *me*, the subject; *that which knows*, is cause itself, the last and highest source and power; it is life in its essence and spirit; it is that which is to live when matter has mouldered and fled to its primary elements.

What nobler objects can be proposed by an Agricultural College? But do they meet the wants of the farmer? And here we are again driven to the inquiry, What are the objects of the farmer? Are they comprehended in all that relates to the tillage of land? That the tillage of land is one object, need not be told; but, are there not other objects which have an equal claim upon him? Yes, and they are objects which stand connected with that wide range of knowledge detailed above. He has to do with them more or less all his days, and in every relation in life.

But we propose to particularize farther, that we may press home the force and power of our argument. Is he the head of a family? he is expected to be a model upon which all eyes of the family may be profitably turned: he buys and sells; he directs and controls; he exercises rights where others have rights which must be respected; he is to conduct schemes and plans for the common good, to a successful issue. For these and many more functions, he wants language to communicate; numbers, to compute and reckon; knowledge of kind, character, value, place, relation, trade and commerce, and of the principles of right and wrong which must guide every adventure. Is he a neighbor? he is still to be the same model of excellence, though in a larger and more extended sense, only he advises, but does not command or direct: mutual rights are to be maintained and respected; obligations are to be punctually satisfied. Is he a citizen? he has many of the same functions to fulfil, but in a still wider field. He has rights in common with others: on what principles do these rights rest? He has rights of person, rights in his citizenship, rights in his property. These rights are embodied and set forth in a charter, termed a constitution, or a charter of rights. The principles on which some rights rest are self-evident; in others, there is complexity involving mutual but oftentimes conflicting interests and unsettled questions. They involve questions concerning man as a species, as a person, a citizen, a subject; concerning man as a governor or judge, as a special member of the body politic, as one of a nation of men, as a minister of good to his race, and finally concerning MAN AS THE REPRESENTATIVE OF GOD ON THE EARTH. For all these functions, it is essential that stores of knowledge should be accumulated; that the intellect and affections should be cultivated; that the reason may go forth untrammelled to the work. If there is truth in these views, then those who maintain that the functions of the farmer are bound up in the tillage of land, be it little or much, degrade his station, limit his sphere and belittle his destiny.

Let it not be supposed from the tenor of the above remarks that it is our wish to spiritualize, in the platonic sense of the word, the pursuits of the laboring man and of the farmer, that he may soar above the ordinary occupations of life, and live in an unprofitable meditation of abstract truth; or withdraw his mind wholly from what is visible, and fix it upon the fancied essences, or more properly the vapors of things: for we belong to that class who wish that realities, those things which are tangible, and which are fruitful in their several spheres, should be the main subject sought after here. While, however, we would guard the mind from ancient error, we would by no means have the student pursue a course whose tendency is to impart the belief that buying and selling is the chief good, and wealth the great object: we would still have him pursue that course which elevates the mind, which improves the intellect, and which shall lead him to regard his spiritual part as the noblest, whose education is after all the great and main thing, and to which all things else are to be subservient.

Whatever view we may take of a plan of education, if we would be true to nature, we must keep in view the fact that man is a compound; that he is both body and spirit; that he has compound wants, wants of the body and wants of the spirit; and we must keep in view the relative value of the two. Nor should we forget that he was not created for a solitary existence, but to maintain an intercourse with his fellows; and that he cannot be independent of them, or can not say I have no need of thee, however humble his fellow's rank may be. He, too, is the subject of government and law. Obedience is to be learnt, as well as taught. Can it be supposed, then, that too much culture can be bestowed upon the mind of man; that in view of man as he is and must be, it is at all probable that his advantages will, under any circumstances, be too great, or beyond his capacity for improvement, so rich that they will be regarded as lavished and lost upon him?

Again, a more thorough education for those who till the ground, than has hitherto been contemplated, seems especially demanded, to enable them to avail themselves of the discoveries of modern science. This, however, is a position which many are now ready to take, although its importance cannot be so well appreciated by those who are placed upon the very rich soils of our country; but those who are tilling soils already exhausted of their natural fertility, see the necessity, and would see it still better, if they could not sell or exchange their farms for the new and exuberantly rich lands of the west.

Leaving this point as it is, we remark once more, that the times and the circumstances of our country require more than ever the cultivation of the minds of this great class of the citizens of our Republic. It was safe in the morning of our country, when oppression taught our fathers the value and the price of liberty, for the husbandman and mechanic to commit most of the duties incident to office, to those who were by their profession allied to a public life. But now in this age, it appears to us, that to the owners and cultivators of the soil should more especially be committed this trust, as they have a paramount interest in the affairs of the state and nation. They who are withdrawn from the sinister influences of a dense city population, where the unworthy and the demagogues of the land are wont to congregate, should now stand up in the halls of legislation and justice, and at least possess themselves of that power to which their numbers entitle them. Some may sneer at the expression, but to us it is plain, that, to the cultivators of the soil is committed the destinies of this country; that to them more especially is committed the great duty of handing down, unimpaired, our institutions to posterity. If this is true, it follows that the intellectual faculties should receive that share of culture which is contended for in this our essay.

We would not by any means be understood, in these remarks, to say that farmers are to become politicians, in the odious sense of the phrase. We mean only that they should understand as much of history, of law and of legislation, and of rights as they are defined in our constitution, as shall enable them to stand up by the side of our professional men, and to encounter successfully the demagogues and party hacks which in these days seem to swarm and multiply out of all proportion to the rest of society. Who, of all our citizens, are so well prepared to act dispassionately and rightly, as those who are located at a distance from the hot beds of party spirit in our cities, and upon a microscopic scale in our villages; as those who quietly plough their fields and gather their harvests? But ignorant men are not fit for responsible posts: it is not the mere tiller of the soil, the untutored laborer, but it is the enlightened workman, the educated farmer, to whom we would commit our great interests; to the plain and unsophisticated but not uninstructed sons of the soil, unskilled it may be in intrigue, but who, when they march up to duty, when they exercise their own personal rights, or act on behalf of their fellow citizens by a delegated power, do it without fear, though frowned upon by the scheming partisan and the ambitious office-seeker.

To conclude, we declare that we care not how many institutions are founded, by what name they may be known, or when or by whom our young men are educated, *provided it is done;* but let not our farmers deceive themselves by founding institutions whose objects are partial and narrow, and which leave out of view those courses of study which are necessary to fit the pupil for the discharge of the duties of a citizen of this republic.

ON THE STUDY OF ENTOMOLOGY.

BY HON. J. BARLOW.

It is gratifying to the general reader and naturalist, that the Quarterly American Journal is devoted, in part, to the interesting branch of natural history, yclept Entomology. This is one of the most fascinating as well as exceedingly useful studies to which we can give our attention; and of all persons most interested, and who may be benefitted by it, are the farmers of our country. Their habits and business of life give them enviable opportunities to enjoy the exhibitions of beauty and wonder of this department of living nature. They are constantly surrounded by teeming myriads of the insect tribes; and if they become familiar with the habits, natures and transformations of these swarms and armies of living creatures, pleasure and profit must be their reward.

For us to remain ignorant of this department of the handywork of infinite power and wisdon, is inexcusable. They were not created in vain, but for definite uses and purposes. Whilst some are apparently predatory, others are of great use to us, and defensive of our interests. It would be impious in us to denounce them as loathsome and useless; for omniscience brought them into being, and it is for us to study their uses, and not despise, condemn and destroy them.

It is true, many kinds are destructive to our property, and in self defence we destroy them; for man will act selfishly even with a worm. But whilst we thus view and tread upon the mischievous worm for intruding upon our pretendedly exclusive rights, we must not forget that man also trespasses against the rights of his fellow man.

Not only will pleasure and profit result from this study, but moral instruction can be drawn from the exhibition of wisdom and power as displayed by the great author of all things, in establishing the laws and order that govern and regulate the changes and transformations that are manifested and undergone.

It is not with indifference that we can witness the changes from the lifeless egg to the living crawling larva; from this to the dormant aurelia; and from this to the gay and splendid butterfly, gilded with its golden tinges, mounting upon its gaudy wings, triumphant over the creeping things of earth, flitting from flower to flower, and sipping the sweets gathered in their cups and upon their leaves. It becomes entirely changed in nature and habits, in form and appearance, from eating the crude leaf, to sucking the honied luxuries of the lilac and rose.

Not only do we draw moral, but high religious instruction from this source. A type, a shadowing of a change from grovelling humanity to spirituality; from mortality to immortality; from an earthly to a heavenly form and existence, through the mysterious power of our creator, is opened to our vision, as if in aid or harmony with scriptural revelation.

Why should we then deny ourselves a knowledge of this branch of natural history and philosophy? The pleasure and utility flowing from a knowledge of botany, are acknowledged by all. It is admitted that a familiarity with the flowers and plants of the field improve the mind and heart. But I think it will be readily acknowledged by all who are familiar with both branches, that entomology is more gratifying to the student and enquirer, and more useful to the practical man of the field and farm.

A knowledge of it is easily attained, and readily understood even by children. The young become pleased with the first lessons, and are made wiser and better by the study. The mind which is ignorant of it, and loathes the sight of the worm, becomes entirely revolutionized and fond of the pursuit. The caterpillar that is deemed an intruder upon the carpeted floor, or leaf of the cherished rose, will not be denounced and rudely crushed as a "filthy worm;" but will be looked upon as a harmless creeping thing, hastening to seek some secret recess or hiding place, where it may safely suspend or enwrap itself, and undergo its change through its defenceless chrysalis to the perfect insect of the wing. It will be seen in prospect, or perhaps within one short week, flying around the hall or garden, eliciting the wonder and admiration of every beholder.

The Journal, being devoted to agriculture and science, is a medium through which will be carried information on this rich and important subject to those most to be improved and benefitted by the study. The wants of those who could not be gratified and supplied from the periodicals of the day, nor from any other source within their means and reach, can now be supplied. It is therefore peculiarly gratifying that such a source has opened through your periodical, and it is to be hoped that a circulation may be secured which will give a general diffusion of this branch of natural history.

With permission of the editors, I shall be pleased to write occasional articles on this subject, which, in my estimation, will be interesting and moral as well as useful.

A BIRDSEYE VIEW OF THE VEGETABLE PRODUCTIONS, CLIMATE, SOIL, AND AGRICULTURE OF THE DIFFERENT COUNTRIES OF THE AMERICAN CONTINENT.

BY C. N. BEMENT.

UNITED STATES.

THE vegetable productions of the United States are exceedingly various : there are some, however, common to every section of the Union. Maize, or Indian corn, an indigenous American plant, is cultivated from Maine to Louisiana, but succeeds best in the Western and Middle States. It is adapted to a greater variety of soils and situations than wheat, and yields generally double the produce : land of the first quality, and in a high state of cultivation, has been known to give over one hundred bushels to the acre. Wheat is also cultivated from one extremity of the Union to the other, but of superior quality in the Middle and Western States. The cultivation of tobacco begins in Maryland, about the parallel of 39°, and continues through all the Southern States, and in the Western States, chiefly south of the Ohio. It forms the staple of Maryland and Virginia, where it is raised to a greater extent than in any other part of the Union. Besides the large quantity made into snuff, segars, and manufactured tobacco in the country, 90,000 hogsheads are annually exported. The soil and climate favorable for cotton are not found beyond 37°, though it can be raised as far north as 39° on both sides of the Alleghanies. It was first cultivated for exportation in 1791, and is raised from the Roanoke to the Sabine, forming the staple of the Southern and Southwestern States. Rice crops require great heat and a marshy soil, and are cultivated to a great extent in the Carolinas, Georgia, Alabama, Louisiana, and as high as St. Louis in Missouri. The sugar cane grows in low and warm situations, as high as the latitude of 33°; but the climate favorable for its production does not extend beyond 31° or 30° : It is now cultivated to a great extent in Louisiana. Oats, rye and barley are raised in all the Northern, and in the upper districts of the Southern States. Hemp, flax, and hops, are produced of an excellent quality. Hemp grows naturally in the Western States, and hops in the Western and Middle States. The vine has been successfully cultivated in various parts of the Union; and the mulberry tree grows spontaneously, and has been extensively planted of late years. Fruits of all kinds of the temperate and tropical climates, and the culinary vegetables which have been introduced from Europe, thrive here. The dairy and grazing are also important resources in the northern and western parts of the country, and great quantities of beef and pork are raised for exportation particularly in the west. The number of sheep in the United States has been estimated at about twenty millions, yielding about fifty million pounds of wool annually.

TEXAS.

Climate. The climate of Texas is mild, agreeable and healthful: the heats of summer are moderated by the sea breezes, but are sometimes excessive during a few hours before sunset, when the breeze dies away. Scarcely any rain falls between March and November, and the vegetation often suffers from droughts. In November, north winds set in, and heavy rains begin to fall: these winds blow during December and January, when the mountains are covered with snow, and the cold is sometimes severe; but the snow seldom lies long in the lower districts. In the early spring, the rains are very copious.

Vegetable productions. The live oak is found of large size in the maritime regions, chiefly between the Galveston and Matagorda bays: the white, red, post and spanish oaks; the cotton-wood, ash, elm, and sycamore or button-wood; the black walnut, hickory, pekan; the locust, musket, and bow-wood; the wild cherry, mulberry, chinquapin, parsimmon, etc., are among the natives of the forests, and there are extensive cane brakes between the Colorado and the Brasos. The soil and climate are favorable to the growth of sugar cane, indigo, tobacco, cotton, rice, indian corn, sweet potatoes, and, in some parts, of wheat, rye, oats, etc.; and the prairies afford excellent pastures all the year round.

MEXICO.

Soil. The low plains on the coast are fertile, and have a luxuriant vegetation. Much of the central table land is dry and sterile; but in those parts which are well watered, the vegetation is remarkably vigorous. In the northwest and northeast are extensive tracts of rich soil.

Although the inhabitants are nourished by the soil, yet agriculture is by no means in a flourishing condition. The variety of soil and climate, however, furnishes a corresponding diversity of cultivated as well as indigenous vegetation. The temperate regions are favorable to the cereal grasses, and all the culinary vegetables and fruit trees of Europe thrive. The cultivation of sugar-cane, indigo, cotton, vanilla, cocoa, and tobacco, has been successfully prosecuted. The banana grows in the warm and humid valleys; and its fruit, which is ten or eleven inches in circumference and seven or eight in length, is an important article of food. Manioc, the root of which also furnishes a nutritive flour called cassava, likewise grows in the hot regions. The magney, or American agave, yields a refreshing drink, called pulque, resembling cider. The dahlias, whose many-colored blossoms give such a splendor to our flower gardens, at the season when the approach of winter renders them doubly valuable, are natives of the hilly parts of Mexico. The sugar-cane, cochineal, etc. are among the productions of the Mexican States.

PERU.

Generally speaking, agriculture is in a wretched state. So languid and backward is it on the coast, that Lima and many other towns along shore depend on Chili for their provisions. This has been ever since the great earthquake in 1793, which was followed by such sterility of the vallies of Lower Peru, that the people in many places ceased to cultivate them. The country has since in a measure recovered its fertility; but till some alteration is made in the mode of cultivation, and greater facilities of communication between the interior and coast are introduced, there is no hope of any great progress in agriculture.

Cotton is found in a wild state, in great abundance, in the Montana Real, on the Guallaga, and on the banks of the Maranon. Flax is common; but the indians leave the stems to perish, and make a kind of beer of the seeds. A species of cochineal, and coffee of an indifferent quality, abound in some districts. The Peruvian pimento is excessively strong; and there is some cinnamon stronger than that of Ceylon, though not so valuable. The cedar, the olive, the wild orange, the palm, the willow, and many other trees are found there. On the coast and western slopes of the Andes, are produced the cabbage-palm, cocoa-nut, chocolate-nut, and cotton-shrub; the pine-apple, turmeric, plantain, and sugar-cane. The large-flowered jessamine, and the *Datura arborea*, diffuse their evening fragrance around the vicinity of Lima. No less than twenty-four species of pepper, and five or six of capsicum, are considered natives of Peru. Tobacco and jalap abound in the groves at the foot of the Andes. The chief shrubs of the uplands are the different species of cinchona, or the salutary peruvian bark. The *caoutchouc* (indian rubber) is procured from the inspissated juice of a variety of different vegetables.

CHILI.

The soil of Chili is extremely favorable to the growth of maize, wheat, barley and rye. Hemp also grows well. The sugar-cane, the cotton-tree, the banana, the sweet potato, and numerous other plants are cultivated. The vine yields abundantly, and the olive likewise attains great perfection. Forests of apples, peach and quince trees, in some places, extend for leagues. Oranges, citrons and lemons, are produced of an excellent quality.

There are some sterile tracts, but in general the soil is remarkably fruitful, and the products are rich and varied. The maritime tracts are less productive than the midland, and these again yield to the vallies of the Andes. Numerous plants are peculiar to the country. The uncultivated parts present the utmost profusion of vegetable riches. The plains, vallies and mountains are covered with a variety of beautiful trees, many of which preserve their foliage throughout the year. Medicinal, dyeing and aromatic plants also abound, and the fruits introduced by Europeans grow in greater perfection than in their native soil.

BUENOS-AYRES.

As almost every soil and climate is to be found within the limits of this country, so every vegetable production would grow by proper cultivation. Indian corn, cocoa, olives, sugar-cane, grapes, oranges, lemons, citrons and figs attain great perfection. Wheat is cultivated with success, and apples, pears, plums, cherries and other fruits are plentiful. Abundance of tobacco is produced in some parts. The soil, like the climate, varies in this extensive country. The forests abound with straight and lofty cedars, which are excellently adapted for ship-building. There are numerous and beautiful species of palm. The manioc, the magney, bacoba, banana and pine-apple are found in profusion.

Climate. The climate is various, but generally healthy. The atmosphere is very humid ; and during summer, rains are frequent, and are commonly acompanied by the most dreadful thunder and lightning. Fogs, snow and hail are seldom experienced, except on the summits of the mountains. In Cayo, on the frontiers of Chili, the winters are excessively cold; while in summer the heats are intense.

GUIANA.

The soil of Guiana is surprisingly fertile, and a most luxuriant vegetation almost everywhere overspreads the country, which abounds with the finest woods, fruits and plants. Many of the trees grow to the height of 100 feet. The most delicious fruits are met with. The guava and aviago pear are found in great abundance, and the pineapples and other fruits are of the finest quality.

The country is subject to heavy and frequent rains, and, from the great prevalence of moisture and heat, is unhealthy.

The cultivated tracts are covered with sugar, cotton, coffee and indigo plantations. In some places the soil is so exuberant, that thirty crops of rice may be made in succession.

BRAZIL.

In a large portion of this country the soil is very fertile. The forests produce trees of a great variety, and of a remarkable size, suited for ship-building and other purposes. They are of a remarkably rapid growth. There are, besides, lighter species of wood, similar to fir; not to speak of logwood, mahogany, an infinity of ornamental and dyeing woods. There are three kinds of *brazil-wood*, which is an important article of export. Melons, bananas, lemons, guavas and oranges grow along the coast; and aromatic and medicinal plants are very abundant. The forests of Brazil are noted for the gigantic growth and great variety of the trees; the profusion and beauty of the flowering shrubs, hanging under a load of blossoms; the strange shapes and enormous strength and size of the creepers and parasitic plants, and the clouds of gaily colored birds and splendid insects that everywhere abound. The *jacaranda*, so well known, and so extensively employed as an ornamental material for furniture under the name of *rosewood*, attracts the eye by the lightness of its doubly feathered leaves and its large golden colored flowers. The cocoa (*theobroma*), or chocolate-tree, from the kernel of which chocolate is made, seems to be an aboriginal native of Brazil, although it is extensively cultivated in other countries.

The *Bertholletia excelsa*, producing the delicious brazil nut, from 15 to 20 kernels of which are enclosed in a thick outer rind; the *copaifera*, yielding the balsam copaiva; the annatta (*Bixa orellata*), much used in this country, under the name of *otter*, for coloring cheese, are a few of the natives of the Brazil fruits. The *Capsicum annuum*, yielding the cayenne pepper; the *Quassia amara*, furnishing a valuable drug; the pungent and odoriferous vanilla; the ipecacuanha, whose root is an invaluable drug; the tonqua bean, much prized for its delicate aromatic seed; the sarsaparilla, noted for its various virtues, are among the economical plants.

Face of the country. Viewed from the sea, the country appears rugged and mountainous; but on a nearer approach, its appearance is highly beautiful and picturesque, clothed as it is with the most luxuriant vegetation, its hills covered with thick woods, and its vallies with a verdure which never fades. Towards the interior, the land rises by gentle gradations to the height of 6000 feet above the level of the sea. A large part of the interior is overspread with an impenetrable forest.

Agriculture. In no country would agriculture yield greater returns to the industrious cultivator, but, unhappily, in no country is it more generally neglected. A passion for seeking gold and diamonds has nearly destroyed all relish for every other labor. Maize, beans and cassava root are raised in considerable quantities. In many parts wheat and other European grains are reared. Coffee and sugar are cultivated to a great extent, as well as tobacco and cotton. Vanilla and sarsaparilla are obtained in abundance.

SOMETHING ABOUT MANURE AND ITS APPLICATION.

BY JESSE RYDER.

ALMOST all the farmers of this country are obliged to depend on the resources of their own farms for the supply of animal and vegetable manures which they can command. Mineral manures are more generally purchasable; but as stimulants and absorbents, they can only operate in conjunction with the vegetable matter of the soil (the humus or mould), the principal supply of which to cultivated land, is obtained from our cattle yards, and is returned to the earth again from whence it came.

It seems to be self-evident to me, that the earth must receive something in return for her productions, or become bankrupt. Either a portion of her produce must be left with her, or an equivalent returned, otherwise she becomes barren and unfruitful.

If I recollect right, Liebig says that perhaps five-sixths of the nourishment of plants is derived from the atmosphere, and all chemists I believe admit a greater or less proportion; but one thing is certain, that a part of their nourishment is derived from the soil in which they grow, the one sixth if you please; and that the richer and better the soil, other circumstances being the same, the better the crop. The roots of plants must be abundantly supplied with their specific food, in that state of preparation which admits of its being appropriated by them, or the plants cannot be fully developed.

I, for one, do not believe that chemists ever will be able to show that the remaining one sixth of their support can also be got from the atmosphere, and that the only use of earth to them would be as a house or home to live in, to keep the plants from travelling about or falling over. If such should ever be the case, production would become too easy to agree with the declaration that "by the sweat of thy face shalt thou eat bread."

It behoves us then to increase the fertility of the soil we cultivate, until it is capable of affording to plants all the nourishment they require of it, in order to develope them fully.

There is great encouragement in the thought that plants derive a part of their food and nourishment from the atmosphere. If it was all derived from the earth, then would it require all the produce of the farm to be restored to it, in order to preserve its fertility. Neither could we afford to lose any thing by the washings of rains, or by solar evaporation, unless there is some natural operation going on, to create soil upon the earth's surface, independent of aid from the atmosphere. Neither could we enrich our soil from its own resources; that is, by returning to it all its produce as manure, without extraneous aid of some kind. But experimental proofs are not wanting to show that a large part of the food of plants *is derived from the atmosphere.*

It must be within the knowledge of almost all good farmers, that their farms have become more and more productive by restoring to them only a part of the produce of the same in the form of manure, aided by judicious management in its application, and a proper rotation of crops. Now a very important question arises, and it is this : Ought we not to increase the fertility of our farms very fast, when it is considered that the larger part of the nutriment of plants is derived from the atmosphere ? That for every pound of food they use of our furnishing, they restore to us three, four, or five pounds more derived from another source, would call for an affirmative answer. As it is well determined that our gain is great, it remains for us to discover the cause of loss, and the preventive too, for lose we certainly must, else : for every load of manure we feed to plants, we ought at the period of its exhaustion to have six times as much on hand, provided the produce is all made use of on the farm, and five-sixths is the amount gained.

I am satisfied that a great deal more than half the support of plants is derived from some other source than the product of decayed vegetable matter in the soil itself, from the fact that grain farms are often made to improve rapidly, from the resources of the farm which are left after selling off the grain, which is the most valuable portion for manure, and after losing a great part of the strength of the manure which is made on the farm by the escape of its gases and salts, for the want, in part, of some substances to combine and retain them for the use of plants.

Again, meadow land can be cropped, and not manured save and except with plaster, and the soil improve meantime (and I even think the same result may be experienced without the use of plaster, but in a less degree of rapidity), as I have shown in a former article. I know that such has been the result where plaster was used. In an improvement of a soil almost destitute of mould, in this way, admitting that it is to be attributed to the use of plaster, there is a great increase of mould, which I suppose is principally carbon ; but the plaster did not contain carbon. It must operate then by promoting the growth of vegetation that does, which must derive it from the atmosphere ; and the operation of the plaster must be by its sulphuric acid combining the ammonia of the atmosphere. I am aware that Dr. Dana attributed its good effects to another cause, viz. the sulphuric acid of the plaster dissolving the silex or gritty matter of the soil, and thus setting free the alkalies contained therein; which in turn dissolve more silex, and thus set free another portion of alkali, and so on. But, in my view, the great effects produced from the use of a little plaster must be attributed to another cause.

I should think the growing crop would naturally appropriate to itself the alkalies, so as to prevent in a great measure the action and reaction spoken of.

If this theory be correct, then ought plaster to operate as beneficially in the vicinity of the sea as elsewhere. The effect produced by the lime of the plaster must necessarily be small; a bushel or two to the acre would not avail much, where forty is not enough.

I adopt Liebig's theory of the action of plaster as being most natural, which is, that it fixes the ammonia which is brought down by rain. I suppose it to be in perfect accordance with the law of chemical affinity, if the sulphuric acid of the plaster has a greater affinity for ammonia than it has for lime.

As a practical proof of the correctness of Liebig's theory, I would state that I have, in experimenting with plaster, applied it to a field of corn, except a spot of three rods square, by first rolling the seed in plaster, and then applying it to the hill after it came up; the result was, a difference so great in the growth and yield, as to convince me, knowing the capabilities of the soil, that the non-plastered portion of the corn was a great deal poorer than it would have been had there been no plaster applied to any of the adjacent parts of the field; consequently the non-plastered portion had been robbed by the plaster of the surrounding corn, of some substance derived from the atmosphere. Hence the usual mode of testing the effects of plaster by comparing parts adjacent, is not fair; the apparent effect being greater than the real. I am sustained in this opinion by a very intelligent farmer of my acquaintance, who came to the same conclusion for himself.

May it not be true, that those farmers who do not use plaster are a little worse off than if their neighbors did not use it. I was told by a farmer who lives near Long Island Sound, that they esteem plaster of very little use, unless it is sowed in the summer, immediately after a shower from the westward.

Liebig says that ammonia is brought down by rainwater, and that in the summer time, when rains are less frequent, a greater portion is brought down at one time. Is the air from the land better charged with ammonia than that from the sea? Does the sea-water absorb it?

When once it is conceded that the soil of a farm can be made to grow rich by the use of manure, made from a great deal less than its own produce, it must also be conceded that the same farm ought to be enriched faster and faster as the amount of its productions increase; and if the majority of farmers barely maintain their soil in a given state of fertility by present management, it follows that any increased effect obtained from a given source of fertility already in common use, must result in a general improvement of the soil, and advance the wealth and prosperity of the country. That such a result would be developed very rapidly, could the manure we make on our farms be made to produce double the effect which it now does, no one can doubt.

I do not believe that the manure which is applied to hoed crops in this country, reproduces itself to the farmer, as a general thing, notwithstanding its auxiliary help from the atmosphere. This is a serious consideration, if we believe that by securing all its valuable properties, it ought to be instrumental in producing five or six times as much. Take a field and apply to it for indian corn the amount of manure made from its own produce for five preceding years, then raise three grain crops in succession, say corn, oats and wheat or rye; and at the end of that time, I am well assured, that the soil will have lost more strength than was imparted to it by the manure of five years. Let it then be laid down to grass for two years, and at the end of that time it will have recovered the elements of fertility, so as to be, generally speaking, about as good as it was before the manure was applied five years previous; the formation of sod being a rejuvenating process.

To be more particular, I should say that the soil of land which is dry and good for grain, would be somewhat improved at the end of the five years, if the grass seed took well; and heavy clayey soils, which are decidedly uncertain for grain without manure, will be decidedly poorer. I consider the grass crop to be a mending crop, and ever and anon tributary to the grain crop. Meadowland sustaining itself by the vegetable matter of decayed roots, would go to show that the crop derived but a small part of its support from the vegetable matter of the soil.

With hoed crops it appears to me that the roots are not numerous enough, and the leaves too few to appropriate and secure any great proportion of the virtues of the manure, which otherwise leach away or evaporate.

I once buried by the plough, in the spring of the year, about sixty ox cart-loads of manure on four acres of sod ground, ploughed the usual depth, five or six inches, soil stiff and heavy; and for aught I have ever seen of its effects, there might as well have been a funeral ceremony at the time of the burying. The season was somewhat wet. What became of the salts of the manure? Planted with potatoes which were poor, then sowed with rye which was poor, and the grass which followed was not as good as it grew before the ploughing. Ploughing in manure on dry land may do better; but I doubt whether one-fourth is ever realized from it that ought to be, if plants derive any considerable part of their support from the atmosphere. I once put about five bushels of strong horse manure in one heap on a timothy meadow, and spread the surrounding parts with like manure, ten two-horse loads to the acre. The manure heap made the grass but little heavier on its borders than it was elsewhere, the ten loads to the acre having brought the land near to its maximum of production (three and a half tons to the acre). Three years after, the grass was little or no heavier where the manure heap was, than on the parts adjacent. Nineteen twentieths of the manure, then, was lost; which is proof positive to my mind, that it is necessary to secure its valuable properties very soon, or they are lost.

Here the farmer requires chemical aid; and great would be the obligations of the people to that man who could discover, and would make known some cheap and practical way of combining and securing for the use of plants, the fertilizing properties of manure. A free use of plaster would, no doubt, effect much by taking up the ammonia as it formed: if so, it ought to be sprinkled over the yards frequently, and mixed with the manure heap; and then when it was applied to the land, would it not leach away into the earth the same as any other salts?

In a practical way, and without asking the chemists any thing about it, I think farmers may double the value of their manure by taking my advice in its application, where the supply is limited. I presume the supply on most farms does not equal one load per acre yearly, for the land in grass and grain; that of the land ploughed, only a portion of it gets a sprinkling in a round of crops; and that if the corn ground is covered, there is none left for wheat. I know that most theoretical and many practical farmers recommend the application of all the manure of the farm to the hoed crops; and thus wear it out, as I think, without securing such a return from it as will leave the land better than it found it.

Our primitive soil is generally rather poor and difficult, and soon reduced by bad management. In many cases, if we do not enrich and improve it, we had best forsake it and go to better land. That system which enriches poor land in the least time, must be good for rich land too. That which enables a poor man to grow rich, must enable the rich man to grow richer.

Experience has taught us here, that to enrich our land, we must apply the manure for our plough land at the time of sowing winter grain, spread it on the furrow, and harrow it in with the grain, which leaves it just where we want it, near the surface; or harrow the ground first, then spread the manure, and plough in the manure and grain together with light furrows.

Now here is the difference between the two systems: If we put all the manure on for corn, on land rather poor and easily worked down, the result is pretty good corn and oats, and poor winter grain and grass succeeding, there being no manure to spare for those crops. When the sod is again turned over for corn, it being poor, the corn again requires barn-yard manure; and thus the land is kept poor, the grass being light, and the manure not increasing in quantity. But let the disposition of the manure be changed: apply it to the winter grain, and then we have good wheat or rye succeeded by good grass, plenty of fodder, an increased quantity of manure, and a sod formed, which, when the land is again ploughed for corn, will enable it to grow as luxuriantly as it did under previous management with the manure applied directly to it. The manure is now left for the winter grain again: there is more of it, and the land grows better very fast.

Suppose the corn on the good sod, as good as it would have been on the poor sod with the manure, what then? Why it was more cheaply fed: there was no volatile salts to escape; none to leach away, that I know of. The difference is like fattening cattle on wheat instead of indian corn or roots; only the one is a loss direct, the other a loss entailed; one like paying direct taxes which we know, the other like indirect taxes which we feel and do not know exactly what the matter is.

With the manure for winter grain, it prevents it from freezing out in the winter and spring; also saves the young timothy, and in many instances lightens the soil so as to preserve the clover roots of the year following. Grass being a mending crop, the land can spare its luxuriant burthen and not be poorer, and the land is improved by the amount of the manure, a luxuriant sod being as it were its representative.

Such, in my view, is a practical way of increasing the effects of manure, and securing for the earth a store of vegetable food derived from the atmosphere.

INSECTS INJURIOUS TO VEGETATION.—No. 3.

BY ASA FITCH, M. D.

THE WHEAT-FLY.

ALTHOUGH several facts in the habits and economy of the wheat-fly had occurred to my notice at sundry times since its appearance in this vicinity, yet as my leisure for studies of this nature was wholly engrossed in other departments of the science of entomology, these facts had been observed in too cursory a manner to be of material value in preparing an account for the public eye. It has not been until the present year, that I have made this and its allied species my particular study. And as some few interesting points still remain undetermined, ere a perfectly complete history of this insect can be given, I should be inclined still to defer preparing a paper upon this subject, but that I deem some of the observations already made of too much importance to be longer withheld, and am moreover very well aware that if no writer ventured to appear before the public until his investigations were so complete in every particular that he could *exhaust* the subject on which he wrote, very little would be published, and the world would have but a small fraction of that amount of information which it now possesses.

It is necessary for me farther to premise, that although we have two distinct species of wheat-flies, as will be fully shown in the sequel of this paper, to wit, the *clear-winged wheat-fly* (Cecidomyia tritici *of Kirby*) and the *spotted-winged wheat-fly*, which has hitherto remained a nondescript; yet as nothing is yet known of the habits and transformations of one of these as distinct from the other, through the body of this article the common name "wheat-fly" will be employed for convenience as referring to both these species.

Future researches, however, may detect dissimilarities in their habits, and show that portions of the following account are true only with regard to one of these.

ITS FOREIGN HISTORY.

The first distinct and unequivocal account of the wheat-fly, of which I am aware, is that given by Mr. Christopher Gullet, in 1771, and published in the Philosophical Transactions of the Royal Society the following year.* From this it would appear that the effects

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* So long ago as the year 1768, Col. Langdon Carter, of Virginia, transmitted to the American Philosophical Society a paper entitled "Observations concerning the FLY-WEEVIL that destroys the wheat;" which was published in the first volume of the Society's Transactions, 2d edition, pages 274 – 287. The account here given, is in nearly all its particulars so strikingly applicable to the wheat-fly, that so much of it as relates to the insect itself merits an introduction in this place. He rather quaintly remarks, "In a pleasant evening, after the sun was down, and every thing serenely calm, I found the rascals extremely busy amongst my ears, and really very numerous. I immediately inclosed some of them in a light loose handkerchief; and by the magnifiers of my telescope, I took occasion minutely to examine them. They are a pale brownish moth, with little trunks or bodies, some trifle shorter than their wings; and as some of their little bodies appeared bulging as if loaded, I applied the pressure of a fine straw upon them, and saw them squirt out, one after another, a number of little things which I took to be eggs, some more, some less: some emitted fifteen or twenty of them; and others appeared extremely lank in their little trunks, which I could not make discharge anything like an egg. Whether they had done this in the field before, or were of the male kind, I could not tell; but from this discovery I concluded that there need not be above two or three flies to an e[illegible] of corn, to lay eggs enough to destroy the greatest crop. * * * It is with much propriety called a weevil, as it destroys the wheat even in our granaries; though it is not of the kind termed by naturalists the *curculio*, of which they have given a very long list; for it is not like a bug; it carries no cases for its wings; neither has it any feelers, with which the curculio is always distinguished; and perhaps (as I fancy it will turn out in the course of this letter that they never attack grain when hard) they really have no occasion for such feelers. For from the make of it, to my judgment it appears an impossibility that it should ever perforate into a hard grain, being furnished with nothing in nature, from the most minute examination by glasses, that could make such a perforation; and seems indeed a fly itself, consisting of nothing sensible to the slightest touch with the finger, nor to the eye assisted with glasses, leaving only a little dry pale brown glossy dust on being squeezed."

I doubt not but that on perusing this extract, almost every reader who is conversant with our wheat-fly will feel confident that it is the same insect to which Col. Carter alludes. Yet if his account be more particularly observed, we gather from it some characters which assure us that it was not the wheat-fly which he examined. Although he uses the terms *moth* and *fly* as synonymous, and nowhere tells us whether his specimens had four or only two wings, yet he could scarcely have spoken of the lively orange color of our wheat-fly as "pale brownish;" and what is yet more conclusive, produced by the wheat-fly had been known for some time to the farmers of England, though imputed by them to a wrong cause. He says, "What the farmers call the yellows in wheat, and which they consider as a kind of mildew, is, in fact, occasioned by a small yellow fly, with blue wings, about the size of a gnat. This blows in the ear of the corn, and produces a worm, almost invisible to the naked eye; but, being seen through a pocket microscope, it appears a large yellow maggot, of the color and gloss of amber, and is so prolific that I distinctly counted forty-one living yellow maggots in the husk of one single grain of wheat, a number sufficient to eat up and destroy the corn in a whole ear. One of these yellow flies laid at least eight or ten eggs, of an oblong shape, on my thumb, only while carrying by the wing across three or four ridges." (*Harris's Mass. Report*, p. 437.)

It was several years subsequent to this date, that the accounts of the appalling ravages of the hessian fly among the wheat crops of America reached Europe; and as this fly was universally believed to have been derived from the old world, extensive and careful examinations of the grain fields there were made, to detect it, that its habits might be learned, and means devised for preventing its becoming such a scourge as it was to this country. These investigations, conducted often at the public expense, and by men whose acquirements peculiarly fitted them for such a work, resulted in a confident announcement, which received general credence for a long series of years, that the hessian fly did not exist in Europe; yet in their course, several other species of insects injurious to the cultivated grains of that continent were discovered, and the wheat-fly received a particular examination. Mr. Curtis, generally so accurate in his statements, says that it was first discovered at this time; but

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his insect, on being pressed between the fingers, left "a little dry pale brown glossy dust;" whereas the wheat-fly leaves no mark upon the fingers, unless it be actually crushed, in which case its fluid juices produce a yellow stain, without any glossiness. Every one accustomed to the handling of insects, will at once recognize the character in question as applying admirably to some small species of moth; and the "Committee on Husbandry" of the Society, in their remarks at the close of Col. Carter's paper, are doubtless correct in their statement, that these insects "appear to be of the same kind with those that do the like mischief in Europe, which a gentleman of Angumois describes to Mr. Duhamel," and which have since become so well known as the "Angumois grain-moth," described by the naturalist Olivier under the technical name of *Alucita cerealella*.

the account already given from Mr. Gullet, shows that it was known in England at least twenty-five years earlier than Mr. C. supposes, and anterior even to the date when the hessian fly was first observed in America.

In 1795, as we are informed by Mr. Marsham, in a paper read before the Linnæan Society, London, and published in their Transactions, vol. iii. p. 142, towards the end of July, Mr. Long had observed an insect that threatened to do much mischief to the wheat crops; attacking one or more of the grains in an ear, and causing the chaff of these grains to become yellow or ripe, whilst the remainder of the head was still green. Mr. Marsham, on opening the chaff of these grains, found an orange-colored powder, and in many of them one or two very minute yellowish-white or deep yellow larvæ, the grain itself appearing to be a little shrunk. Mr. Markwich of Sussex also observed the same larvæ in his wheat, the forepart of August, but was confident they had done no injury to it. The same larvæ were also noticed by Mr. Kirby, this year, in Suffolk.

In a subsequent paper from Mr. Marsham (*Trans. Lin. Soc.* vol. iv. p. 224), we are informed that Mr. Markwich, July 12, 1797, saw the flies themselves, at rest upon the heads of the wheat, and also a few of the larvæ within the flowers; and that awhile later in the season the fly appeared reduced in numbers, whilst the larvæ had become much more abundant. From heads of the wheat enclosed in a flowerpot, he reared the fly, and also its parasite; the fly thus obtained having "spotted wings," a fact which we shall revert to hereafter.

Following this account is an excellent article (p. 230) by the Rev. William Kirby, who has since become so well known by his various writings upon entomology. Mr. Kirby here gives a scientific description of the wheat-fly, bestowing upon it the specific name *tritici*, by which it has been definitely distinguished by all subsequent writers, and correctly referring it to the genus *Tipula* of Linnæus, a genus which, in consequence of the vast number of species afterwards discovered to be comprised under it, naturalists have since found it necessary to subdivide; and the species in question at this day falls within that group to which the name *Cecidomyia* was given by Latreille, an arrangement concurred in by Mr. Kirby himself in his communication in Loudon's Magazine of Natural History, vol. i. p. 227; and which I note thus particularly, as by most writers in our agricultural papers it is still spoken of as solely the *Tipula tritici* of Mr. Kirby.

In this article, and another presented about a year afterwards (*Trans. Lin. Soc.* vol. v. p. 96), Mr. Kirby gives a large number of most interesting and valuable observations upon this insect, the correctness of which, generally, more recent investigations have fully attested. With regard to its abundance at that time, he says he could scarcely pass through a wheatfield, in which some florets of every ear were not inhabited by the larvæ; and in a field of fifteen acres, which he carefully examined, he calculated that the havoc done by them would amount to five combs (twenty bushels).

From this time, we have met with no notices of the wheat-fly, except occasional references to the articles above mentioned, until the year 1828, when, and for a few of the following years, it again appeared in such numbers and with such havoc in several of the counties of England and Scotland, as to elicit communications in the magazines from several writers. In some districts of Scotland, its devastations would seem to have approached in severity what has been experienced upon this side of the Atlantic; for "Mr. Gorrie estimates the loss sustained by the farming interest in the Carse of Gowrie (the rich alluvial district along the Isla and its tributaries in Perth and Forfarshire) by the wheat-fly alone, at 20,000*l.* in 1827, at 30,000*l.* in 1828, and at 36,000*l.* in 1829" (*Encyc. of Agric.* 3d Lond. ed. p. 820. § 5066). And Mr. Bell, writing from Perthshire, June 24, 1830, says, "We are anxious to have the present cold weather continue for another ten days, to prevent the eggs from hatching, until the wheat be sufficiently hardened and beyond the state which affords nourishment to the maggot. Another year or two of the wheat-fly will make two thirds of the farmers here bankrupts" (*Gardener's Magazine*, vol. vi. p. 495). Mr. Gorrie, in a letter dated at Aunat Gardens, Errol, Perthshire, Sept. 1828 (*Loudon's Mag. of Nat. Hist.* vol. ii. p. 292), solicits information "on the nature and mode of propagation of a fly which has this year destroyed about one third of the late sown wheat all over this country." He describes a small yellow caterpillar, one eighth of an inch long, as numerous in the young ears of wheat, completely devouring the young milky grain, becoming torpid in about twelve days, and in six days more changing to a small black fly. In a subsequent communication, Aug. 1829 (p. 323), he corrects the latter part of the above statement, and says, "At that time I did not know that a yellow fly had deposited the eggs within the glume, which became maggots. Observing numbers of black flies on the ears of wheat, I believed they had been the produce of the caterpillar. I have this season, however, observed the yellow fly (described by Rev. W. Kirby) deposit its eggs in the wheat-ear," etc. I notice this more particularly, because the farmers in this vicinity, with scarcely an exception, have fallen into the same error, and to this day suppose a small black fly, of the family *Muscidæ*, which occurs abundantly in wheat-fields, to be the real wheat-fly.

Mr. Patrick Shirreff, of East-Lothian, gives, in the same volume of Loudon's Magazine, pages 448 – 451, an excellent and very accurate summary of the habits and transformations of the same insect, the result chiefly of his own observations. For a concise account, this is not surpassed by any that has fallen under my notice.

Still more recently, this subject has been investigated by Prof. Henslow, from whom a communication appears in the Journal of the Royal Agricultural Society of England, vol. ii. p. 26; and in the same journal for the present year (vol. vi. p. 131. plate M.) an admirable production is inserted from the pen and graver of that accomplished naturalist, John Curtis, F.L.S., giving much more accurate and precise descriptions and delineations of the wheat-fly, in the different stages of its existence, than any that had previously appeared. To it I am particularly indebted for such characters as enable me to say without a doubt, that the clear-winged wheat-fly of America is identical with the English *Cecidomyia tritici*.

In closing this summary of the notices of the wheat-fly abroad, I would allude to what has occurred to me as perhaps true in the history of this insect, to wit, that it has somewhat *regular periods of recurring* in such numbers as to become a pest to the agriculturist. Thus, it would appear from Mr. Gullet's account, that it had been common for a few years previous to 1771. After an interval of twenty-five years, it is again observed plentifully for three or four years, and in different districts, by Messrs. Kirby, Markwick and Long. Again it ceases to elicit attention, until a period but a little longer elapses, when, in 1828 and the following years, it forces itself once more and still more prominently into notice. All that I design, is, to direct attention to this point: the facts are as yet too few and too vague to justify anything more than a suggestion. The observations of Mr. Kirby, reaching now over half a century, could probably shed some light upon this most interesting topic.

As respects the *extent of its range abroad*, it has been noticed in most of the southern and eastern counties of England, from Cornwal to Norfolk, and also in Shropshire; in Perthshire and the Lothians, and probably in other districts of Scotland; and in the north of Ireland. Whether it occurs upon the continent of Europe, we are not positively informed. It is not noticed by Macquart, either in his Diptera of the North of France, or his Natural History of Dipterous Insects (for a perusal of which I am indebted to the courtesy of Dr. T. W. Harris of Harvard University); and we can scarcely believe that if it existed in his district, it could have been overlooked by so assiduous a naturalist. M. Herpin, however (as we are told by Mr. Curtis), is of opinion that it is an inhabitant of France, and the statement which he makes strongly supports this opinion. He says, "I have also found in ears of corn, at the time of flowering, many little yellow larvæ, very lively, from two to three millimetres long, lodged between the chaff of the grain: these larvæ nibble and destroy the generative organs of the plant, and the germen where they are found are sterile. These larvæ appear to me to have a very great analogy with those which have been described in the Linnæan Transactions, under the name of *Tipula tritici*: it is probably a *Cecidomyia*." M. Herpin placed several ears of diseased barley and wheat in bottles, and in these bottles a number of cecidomyia flies were afterwards found. Meigen—a copy of whose noted work upon the Diptera of Europe I regret that I have been unable to meet with—as I learn from Mr. Curtis's paper, gives descriptions and figures of the wheat-fly. Were his specimens collected in Germany, or received from England?

ITS DOMESTIC HISTORY.

It will be unnecessary to particularly specify the various notices of this insect, that have appeared in the different agricultural papers of the Northern States during the last twelve years. The more important and valuable of these may be found in the several volumes of the Cultivator and of the New-England Farmer. An excellent summary of the history and habits of the wheat-fly, both in this country and abroad, is also given in Dr. Harris's Report on the Insects of Massachusetts, p. 437-444. Mr. Gaylord's paper on injurious insects briefly notices this species (*Trans. N. Y. State Agric. Society*, 1843, vol. iii. p. 145 – 147.)

With the prominent facts that have been laid before the public by our agricultural periodicals, every intelligent farmer is already familiar. The great difficulty experienced by persons but little conversant with zoological science, in determining what this wheat-worm really was, forms a striking feature in the earlier notices that appeared respecting it. Thus, by some it was for a time regarded as an animalcule of the *vibrio* genus, analogous to the "eels" generated in vinegar and paste. By others, and quite extensively, it was pronounced to be a *weevil*, and this very improper name is to this day often applied to it. Others, still, deemed it to be "Monsieur Tonson come again," considering it as a return of the *hessian-fly* to a section of the country from which it had long been absent. It would be easy to point out how erroneous each of these opinions are ; but I deem it wholly unnecessary, as the public mind is now no longer distracted upon this subject ; and the correct view, that this insect is a fly, peculiar in its habits, and differing from any of those previously known in this country, universally prevails.

It is not improbable but that one or both of the species of the wheat-fly may have been present in this country, in limited numbers, many years before it was distinctly noticed. In truth, common as this insect still is in this district, if our farmers, guided by the knowledge they have acquired of it, were not zealously searching for it in every field, I much doubt whether it would be at all observed here at the present day. And often too when a careful examination of the growing grain leads to a belief that the crop is scarcely infested, an inspection of the threshing-floor, or of the screenings of the fanning-mill, will frequently demonstrate that it was present in much greater abundance than was surmised. These facts plainly show, that this insect *might* lurk a long time in our country wholly unobserved.

Mr. Jewett says the wheat-fly first appeared in western Vermont in the year 1820 (*New-Eng. Farmer*, vol. xix. p. 301). It was not, however, till the years 1828 and 1829 that it became so numerous as to attract the attention of community ; the same years, be it observed, when its ravages were so annoying in Scotland. It was in the northern part of Vermont, bordering upon the line of Lower Canada, where it became so excessively multiplied at this time ; and from that, as a central point, it seems to have extended in nearly all directions. In this vicinity, one hundred and twenty-five or fifty miles south of the locality above indicated, it was certainly observed in 1830 ; and in 1832 the wheat crops were so completely destroyed by it, as to lead to a general abandonment of the cultivation of this grain. Having spread east over Vermont and New-Hampshire, it in 1834 appeared in the State of Maine, and continued to advance in that direction, it is said, at the rate of twenty or thirty miles a year. Westward its progress would seem to have been less rapid, and along the Mohawk river by no means so generally destructive. It is not till within a year or two past, that it has appeared in the Black river country east of Lake Ontario, as I am informed by an intelligent gentleman resident there ; nor until the present season that it has been so injurious as to induce in some instances a premature mowing of the crop, and preserving it for hay. Rumor states that farther west, in the wheat-noted Genesee country, it has been detected for the first time the present year.

The history of its career, appears to be quite uniform in most of the districts hitherto visited by it. About two or three years after its first arrival at a particular locality, it becomes most excessively multiplied, and the devastations which it now commits are almost incredible. Though I believe that through unduly excited fears, or a hope of thereby destroying hosts of this marauder, a mowing of the crop whilst yet green, and a curing of it for hay, has often been resorted to, when, had it been harvested as usual, a less sacrifice would have been made ; yet many cases have occurred, in which diligent search by different persons has failed to discover a single kernel of grain in any of the heads of an entire field !

This havoc, so extreme and general, though not universal (for some fields even now escape with comparatively little injury), lasts but one or two years. The numbers of the pest, and its consequent ravages, soon become sensibly diminished ; and after the lapse of a few seasons, the cultivation of the wheat crop is again found to be comparatively safe, and its yield only in isolated instances materially lessened by the continued presence of the fly, which has now become probably a permanent inhabitant.

It is commonly supposed that this rapid diminution in the numbers of the wheat-fly has been produced by the general abandonment of the cultivation of wheat in this section of the country ; that thus the insect, having no place to deposit its eggs where its young could be nourished, has become measurably "starved out." But that this opinion is erroneous, is I think evident from one or two facts. During this entire period, since notice was first attracted to the wheat-fly, there are some farmers who have every year continued the cultivation of wheat with very fair success, their crops having been in no one of these years so severely injured as to dishearten them; and their respective situations are so dissimilar, that this immunity can with no plausibility be attributed to any peculiarity in the locations of their farms. Now if the swarms of these insects which for a time pervaded every neighborhood through this entire section of country, and which possess a power of wing capable of bearing them from twenty to fifty miles in a single season, had been in the "starving" condition supposed, how have the fields alluded to escaped destruction? Certainly these myriads of tiny creatures could not have been reduced to such straits for want of the appropriate repository for their eggs, until after these crops had been utterly consumed. And, with the insect not exterminated, but still everywhere common, now that the culture of wheat has been gradually returned to with such success that it has again become general, why has not the fly again increased? Why have the considerable crops of the past and the abundant ones of the present year in this (Washington) county, been so little injured? I am firmly persuaded, therefore, that the speedy diminution in the numbers of the wheat-fly, which soon follows a season in which it has been extremely annoying, can not be truly assigned to the cause above stated; but that it is rather to be attributed to that beautiful provision of nature, long since observed, and additional instances of the truth of which are brought to light by the investigations of every year, to wit, that an undue increase in any of the species of the animal or vegetable world never takes place, without being speedily succeeded by a corresponding increase of the natural enemies and destroyers of that species, whereby it again becomes reduced to its appropriate bounds.

Whenever once introduced, it is probable the wheat-fly will ever after continue in limited numbers, laying the wheat crop annually under a moderate contribution for its support. Isolated fields will occur where its devastations will be quite serious, whilst the crop of the district generally will suffer but little, and many fields none at all. Such has appeared to be its history in this vicinity for several years past. Seasons favorable for its multiplication will doubtless occur, when its injuries will be much augmented; as well as seasons of a reverse character, when its presence will scarcely be known. It is, therefore, very important that the entire history and habits of this insect should be accurately traced out. For only with a full knowledge of these, can we be able to resort intelligently to such measures as will keep its numbers constantly limited, or sweep it from those fields that will probably at times be excessively infested by it.

Its habits.

Relying upon the correctness of the published statements, that it was not till "towards the last of June" that the fly infests the wheat-fields, and that "the principal deposite of eggs is made in the first half of July," I had not commenced searching for it, when on the 16th of June I was informed by a neighbor, that it had been present for some days in large numbers, in a field of thrifty winter wheat of his. Upon repairing to this field, a small black fly, about one third of the size and much resembling the common house-fly, was pointed out as the dreaded enemy; and so universally has this doubtless harmless species been for years regarded as the true wheat fly by the farmers throughout this whole section of the "infected district," merely from the circumstance of its occurring abundantly in wheatfields simultaneously with the wheat-worm, that my companion was much surprised, and disposed to be incredulous of my assertion that *that* was not the wheat-fly. On opening the flowers of the wheat, however, the eggs of the real marauder were found in abundance; and a sweeping, with the small gauze fly-net in common use by entomologists, between the stalks of grain towards their roots, immediately caught within it a number of the winged insects. My comrade was little less surprised on my pointing the real fly out to him, being scarcely able to conceive that such a tiny fragile atom, seemingly a mere moat floating before his eye, could be that potent enemy that had spread such desolation over our land. Several of the specimens thus caught, were of the spotted-winged species. These I conjectured, until I afterwards came to examine them attentively with the microscope, were only a variety of the common or clear-winged species, else I should not have failed to have regarded them more particularly.

All parts of this field of four acres were found to be infested more or less with the wheat-fly, but they occurred most abundantly along one of its sides, in the field adjoining which, wheat had been grown the preceding year, which had been considerably injured by this insect. Such a host of destroyers as were here found, and the profusion of eggs that had been already deposited, strongly indicated that it must have commenced appearing in its winged state many days previous to this time.

The wheat-fly may be met with daily, from the fore part of June, until so late at least as the middle of August. Although it congregates in swarms about fields of wheat at the time they are in blossom, it also occurs in a great variety of other situations. It often enters houses, upon the windows of which it may be observed dancing along the panes of glass, sometimes in numbers. It may also be taken among the grass of pastures, and of alluvial meadows that have never been turned up by the plough. It is sometimes found in shady places, particularly along the margin of streams, associated with other minute species of *Tipulidæ* in those dances in which swarms of these insects so often engage. One specimen was met with on weeds, in the margin of an extensive and dense forest, through which it must have made its way, or over an adjoining lake a half mile broad, on the opposite side of which was the nearest cultivated ground.

The fly, during the sunshine of day, moves about but little, remaining mostly at rest, or lurking about in the shade furnished towards the roots of the growing grain. In the twilight of evening it becomes active, and continues so perhaps during the entire night; for before the morning sunrise it may be seen abundantly upon the wing, though less agile than in the evening, as though it had now become somewhat wearied, or was rendered sluggish by the coolness and dampness of the night air. Upon cloudy days, also, it resorts but little to its accustomed retreats. But it is during the evenings which succeed hot days of sunshine that it appears to be most busy and full of life. If a field infested with them be visited with a lantern at this time, such hosts as were little imagined to exist, will be found busily hovering about the grain, the most of them with wings and legs extended, dancing, as it were, slowly up and down along the ears, intently engaged in selecting the most suitable spot where to deposit their eggs. This being found, the insect alights, and standing upon the outer glume or chaff of the kernel, curves its abdomen so as to bring the tip in contact at right angles with the surface of the glume. It now toils industriously to insinuate its ovipositor through the scale, which is not accomplished till after a considerable exertion. Sometimes even, the scale having probably acquired too much maturity and hardness to be pierced by the tiny stinger which the fly protrudes, it is foiled in its efforts, and, as if vexed at its ill success, spitefully jerks apart its wings and darts away. This occurrence, however, is rare. And having penetrated with its ovipositor into contact with the germ of the future grain, through this tube one egg after another is passed in at short intervals until several are deposited. The usual number of eggs thus deposited, appeared to be from six to ten; and as thrice or four times as many larvæ can sometimes be met with on a single germ, it is probable that three or four insects sometimes successively puncture the same floret. Very frequently two, four or six flies may be seen at the same time on different florets of the same ear, depositing their eggs; and Mr. Shirreff says, "Upon one occasion I numbered thirty-five flies on a single ear, and, after carrying it a distance of a quarter of a mile, six of them still continued to deposit eggs." This work being done, another laborious task for the tiny creature remains, that of withdrawing the ovipositor; and to accomplish this, the energies of the insect are sometimes inadequate, and it remains, Prometheus-like, chained to an immovable mountain, until it expires. This curious fact, first observed by Mr. Kirby, I have seen fully verified, meeting in several instances with the dead insect still remaining thus suspended.

Although the flowers of the wheat are the favorite resort of this insect for depositing its eggs, yet it is not limited solely to this plant. It is currently reported to have been occasionally met with in rye and oats in this country. Mr. Shirreff and Mr. Gorrie both found the wheat-worm in ears of the quack or couch grass (*Triticum repens*, Linn.; *Agropyrum repens*, Pal. de Beauvois); and the latter gentleman hereupon rather naively remarks, "The fly has not known that modern botanists no longer ranged the couch grass among the wheat tribe; but, like myself, it is most attached to the Linnæan names and system." Mr. Markwick also found the same worms in the wild bearded oats (*Avena festuca*, Linn.).

The *eggs* are of an oblong, cylindrical form, with rounded ends. They are pellucid and nearly colorless at first, but acquire a yellowish tinge ere they are hatched, which is in rather over a week after they are deposited.

The *larva* has two distinct stages in its existence : an *active* or growing state, which is passed through in about a month; and a *dormant* state, which then supervenes, and continues through the winter. This latter has been generally but incorrectly regarded as its pupa state by writers.

When it comes from the egg, the larva is a minute oblong soft worm, without feet or hairs, and transparent or of a whitish tinge at first, but soon changing to a bright amber or orange yellow. It moves but slowly, and with difficulty, by a wriggling motion of its body. It remains within the particular floret in which it is hatched, until it attains its full growth. Mr. Kirby says it feeds upon the pollen of the anthers ; and perhaps it does so at first, but certainly whilst they are yet quite small, all the worms within the floret cluster upon the sides of the germ, and generally towards its base (Plate 5, fig. *a*). I apprehend they chiefly subsist and attain their growth there, upon the fluids destined for the nourishment of the germ, and which, for want of these fluids, becomes shrivelled to a greater or less degree, and does not attain that plump form on which the value of this grain so much depends. The amount of injury received by the individual kernel of grain varies according to the number of worms that have been nourished in the chaff in contact with it. If mature worms grow from all the eggs deposited by the fly at a single puncture, the kernel is doubtless rendered worthless ; but a single worm, as is occasionally found, would scarcely produce a perceptible effect.

Having attained its growth, and in its dormant state, it does not differ sensibly, as I have been able to discover, from its previous appearance ; and the only reason for marking this as a distinct stage, is, that the insect now remains for a long period (probably two-thirds of its entire term of existence) without increasing in size or undergoing any other perceptible change. The texture of its body seems to have acquired rather more firmness than it possessed while it was growing, and its motions are more sluggish. It is less than the tenth of an inch long : a measurement of several specimens gives 0.07 as their average length. It is of a rich orange color, and of an oblong-oval form (Plate 5, fig. *b*), being broadest in the middle and rounded at each end: it is slightly depressed, the under side being considerably flattened; thus in form considerably resembling the leech when contracted. Its joints are indicated by slight transverse impressed lines, by which it is divided into twelve segments of about equal length. Sometimes a brownish cloud is perceptible near the middle of the body on its under side, which is probably caused by alimentary matter. If these worms are placed for some days on a plate in a dry room, the outer skin of the body becomes so dry and indurated that the worm is incapable of making the slightest motion; but on covering them with a wetted cloth, the surface again in a short time becomes pliant and yielding; and if pressed with a needle, the animal writhes, and sometimes turns itself over to escape from the annoyance. I doubt whether it ever moults, or casts off its skin, between its egg and its pupa state; but my observations have not been sufficiently exact and prolonged, to speak positively upon this point.

This is the form in which the insect passes the autumn and winter. The accounts of writers disagree as to where the worm remains during this period; in fact few of them speak distinctly upon this particular point. Mr. Kirby, however, describes the worm as still continuing in the heads of the wheat; but as a considerable portion of them are missing, he thinks these have been destroyed by parasitic enemies. He says, "I have seen more than once, seven or eight florets in an ear inhabited by the (active) larvæ, and as many as thirty in a single floret, seldom less than eight or nine, and yet I have scarcely found more than one pupa (dormant larva) in an ear, and had to examine several to meet with that." Mr. Gorrie, on the other hand, asserts that the maggots quit the ears of the wheat by the first of August, and enter into the ground, where they remain through the winter. Mr. Shirreff, also, from finding the fly much more abundant in fields where wheat had been grown the preceding year than it was in other fields, entertains the same opinion. Now the truth is, Mr. Kirby and Mr. Gorrie are both right. A portion of the larvæ leave the grain before it is harvested, and descend to the ground, where I have found them, under mouldy fragments of straw on the surface, or buried a half inch or less within the soil. I thus found them, common in the field already spoken of as examined on the 16th of June, a few days after the grain was harvested; and also early in March, in a field in which wheat was grown the preceding year, that had been somewhat injured by the fly. Another portion of these larvæ remain in the heads of the wheat, and are carried into the barn, where they may readily be observed upon the threshing-floor, and found in quantities among the screenings of the fanning-mill, a considerable portion of which sometimes consists of these worms. Thence our farmers *kindly* empty them out at the door of the barn, where most of them doubtless find among the litter of the yard a bed equally as comfortable and secure as that in which their brethren in the field are at this time reposing.

Whence does this singular diversity in the habits of these larvæ arise? Why do one part of them leave the wheat, and enter the ground ere the harvest; and another portion remain within the ears, to be carried into the barn when the grain is housed? for all the worms are undoubtedly fully matured before the grain becomes ripe and hard. Two well attested observations I think shed much light upon this subject; and if the inference that they have led me to be correct, this point will be regarded as one of the most interesting that occurs in the economy of this insect. Mr. Harris informs us, that "after a shower of rain, they (the larvæ) have been seen in such countless numbers *on the beards of the wheat,* as to give *a yellow color to the whole field;*" and he refers to the New-England Farmer, vol. xii. p. 60, in confirmation of this statement, a volume which I have not at hand. For an analogous but still more instructive fact, I am indebted to Gen. M'Naughton, a practical farmer of this town, the accuracy of whose statements no one acquainted with him will doubt. In 1832, his wheat, in which the fly had made sad havoc, was cradled and lying in the swath, when a moderate rain came on, followed by a damp cloudy afternoon. At this time, with his hired help, he repaired to the harvest-field to bind up the grain. They here found not only the heads, but also *the straw in its entire length sprinkled over with these worms.* On my observing to him, that I could scarcely believe it possible for a footless worm to crawl along the straw when it was lying horizontally, he stated that he was particularly positive with regard to that fact; for he distinctly recollected that it was impossible for him to draw the band around a bundle and tie it (in which process the heads of the grain are not touched), without having at least a half dozen of these worms adhering to his hands.

From these facts, I infer that the worm does not crawl out of the chaff and "drop" itself to the ground, as has been stated by some writers; but that having attained its growth, it lies dormant within the chaff, awaiting a favorable state of the weather in which to make its descent, to wit, a rain which is not immediately followed by a clear sky and warm sun that would soon dry the straw. Hence it is doubtless almost invariably by night that this journey of the worm is performed, and that it has therefore never been seen. The straw itself being wet, and the body of the worm rendered supple by the moisture surrounding it, it leaves its abode in the head of the wheat, and adhering to the wet straw by the glutinousness of the surface of its body, gradually works its way downwards by the wriggling motion to which it so often resorts when disturbed, until it reaches the ground. That there is such a glutinous secretion upon the surface of the worm as would enable it to adhere to the wet straw in the manner supposed, I might adduce a number of facts to prove. I was desirous of taking a drawing of the larvæ which I found among wheat-stubble last March; but particles of earth adhered to them so firmly, that I could not separate them with the point of a needle without also mutilating the worms. A few weeks since, on visiting a neighbor's threshing-floor, I gathered a number of larvæ by moistening the end of my finger and touching it to the worm, which, thus adhering, was scraped off upon the edge of a tin box. The box is now before me, with each of the worms alive, but firmly glued to its sides, and many of them to each other; and on forcibly removing some of them, the outer dried and hardened case of the worm is fractured in the operation.

It would thus appear, that those worms which are matured, leave the grain at the close of a shower, and crawl down the wet straw to the earth. It may be, also, that a heavy night-dew sometimes furnishes a sufficient degree of moisture to enable them to do this. But, on the other hand, those worms which are later in arriving at maturity, in awaiting suitable weather for making the same descent, are, ere such weather arrives, carried with the grain into the barn.

As illustrating the strong tenacity of life possessed by these larvæ, I may in this connexion state, that the few specimens gathered in March as already stated, were placed with a little earth in a vial, and a piece of gauze tied over its mouth, for the purpose of ascertaining the transformations of the insect, if any, from its then condition to that of a winged fly. Other avocations diverted my attention, and this vial was forgotten for a fortnight; by which time the earth within had become so completely dried, that not doubting but the worms had all perished, no farther attention was paid to it, and it remained in a dry room over three months, until the middle of June, when, on examining it, half the specimens put into the vial were found to have completed their transformations; a corresponding number of dead wheat-flies being found attached to a straw in the upper part of the vial. Prof. Henslow thinks that it is only those larvæ that are punctured by ichneumons, that leave the wheat-ears and enter the ground; but the facts now stated, show that this opinion is erroneous.

On removing the earth from the vial above alluded to, the cases of the *pupæ* from which the flies had proceeded, were found very perfect. These conclusively showed that the real pupa is not formed until in the spring, and that it is then altogether different in form from what has been described by writers as its pupa.* It corresponds identically in its appearance (perhaps with the exception of color) with that of the *Cecidomyia salicis*, as exhibited in the first volume of this Journal, Plate 2, fig. 1. It also closely resembles the figure of the pupa of *Cecidomyia pini*? as given from De Geer in Westwood's Introduction to the Modern Classification of Insects, vol. ii. p. 518. fig. 125. no. 7.† Its length is slightly less than that of the dormant larva. The antennæ, legs and wings, are each enclosed in separate sheaths, which lay externally to the integument in which the body is enveloped. The three pairs of legs all lay parallel and in contact with each other upon the breast, reaching far down past the tips of the wings; the inner pair being shortest, and the outer pair longest. Judging from the analogy afforded by the *Cecidomyia salicis*, I presume the wheat-fly only remains in its pupa state three or four weeks in the latter part of May and the fore part of June.

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* Since making this discovery, I have strongly suspected that the pupa of the hessian fly has never been as yet detected; and that its "flaxseed state," which has all along been regarded as its pupa, is only the same state which I have described as the dormant larvæ of the wheat-fly. (Subsequently [illegible])

† I cannot but regard the figure here referred to as inaccurate, in representing the wings as enclosed in one common case, *over which* the legs are laid. The tips of the wings should probably be rounded, instead of being brought to a point.

ITS NATURAL ENEMIES.

One of the most effective natural destroyers of the wheat-fly, is undoubtedly our common yellow-bird (*Fringilla tristis*, Lin.) Fields much infested by the insect, have been for many years recognized even by passers on the highway contiguous to them, by the rough and ragged aspect of the heads of the grain (Plate 5, fig. *c*). I am not aware that the cause of this peculiar appearance has ever been stated in any of the communications that have appeared in our agricultural papers. It results from the operations of this bird. Alighting, it adroitly grasps the wheat-stalk just below the ear, and clinging fearlessly to it, even when swayed to and fro by the wind, it with its bill parts down the chaff from the grain, and one after another of the worms to which it thus gains access are rapidly picked off and devoured. Thus several heads are generally freed from the worms, ere its repast is completed. That it is the worms and not the grain that it is in pursuit of, is readily ascertained by an inspection of the heads after the bird has left them : many of the kernels, not being sufficiently loosened to drop to the ground by the operation, will be found remaining, the maggots that were upon them only having been removed; whilst those kernels of the head which are not infested by the worm, are passed over untouched. It is curious that this little creature, by a tap with its horny bill, or some other process, is enabled to distinguish those scales of chaff which conceal so minute a worm, from those which do not; a knowledge which we only arrive at when we have parted down the chaff. A flock, numbering about fifty, embracing both male and female birds, appeared to make the field which I examined on the 16th of June their constant resort, for a period of three weeks or more, where they could be seen busily occupied almost constantly every day. The number of worms consumed by them during this time must have been immense; and I cannot but believe that this lovely bird will henceforward be esteemed for its utility, as much as it has heretofore been for its beauty.

I have as yet found but one insect parasite, which I am well assured subsists upon and destroys the worm of the wheat-fly. It is a hymenopter of the family *Chalcididæ;* but my acquaintance with the details of its history is as yet too limited to attempt an account of it. I shall be much disappointed if I do not meet with still other species which prey upon the wheat-fly; and as all these parasites upon the Cecidomyiæ are more or less closely related to each other, they can probably be most advantageously presented in a separate article devoted exclusively to that subject.

Four or more species are known abroad, which destroy the wheat-worm. One of these, it is stated in the first volume of the Edinburgh Quarterly Journal of Agriculture, deposits an egg beside an egg of the wheat-fly, the worm from which devours the wheat-worm soon after it hatches, and thus effectually saves the wheat. The observations of Mr. Shirreff upon another of these, cannot but interest the reader. He says, "Upon presenting four larvæ (of the wheat-fly) to an ichneumon, it soon stung, or, according to Mr. Kirby, deposited an egg in each of their bodies, and stung one of them a second time. The maggot writhed in seeming agony, and straggled upon my thumb-nail, where it was again stung three times by the same fly; and in a second struggle, both fell to the ground.

ARTIFICIAL MEANS FOR ARRESTING ITS RAVAGES.

These may be divided into two classes, as they refer to the protection of the grain from the fly when in its winged form and depositing its eggs; or as they are directed to the destruction of the fly itself, in the previous stages of its existence.

Several measures have been proposed, and some of them with much confidence and plausibility of reasoning, for protecting the wheat crop from this insect during the period of its blossoming. The more prominent of these I will advert to.

The smoke of a number of smouldering fires, or of brimstone matches, in different parts, and particularly upon the windward side of an infested field, has been recommended. The known efficacy of smoke in repelling the musketoe renders it probable that this remedy would be of signal utility, were it not for the discouraging amount of labor that is required to make so thorough and protracted a use of it as would be necessary.

It has been suggested that the anal follicles of the skunk (*Mephitis americana*, Desm.) might be extracted, and that yarn impregnated with the fluid contained in them, and suspended through wheat-fields, would, by its intolerable odor, banish the wheat-fly. I imagine that in carrying this suggestion into practice, the operator would be *the greatest sufferer* — "unless *my nose* deceives me."

Sowing the field with lime at the time the wheat is in blossom, has been repeatedly, and by some with much confidence, urged. This remedy has been much resorted to, and very conflicting statements with regard to its efficacy have been laid before the public. A simple experiment, directly to the point, is of more value than a thousand cases that *tend to support* any particular opinion; and such an experiment I am prepared to narrate. Jarvis Martin, Esq., the owner of the infested field repeatedly alluded to, at my suggestion, repaired to it one evening, and sprinkled several of the heads with tolerably fresh air-slaked lime, until they were white with the powder adhering to them; thus applying it far more profusely and effectually than can be accomplished by any "sowing" of this substance. With the light of a lantern, these heads were now closely watched, and the flies were observed to hover around and alight upon them as freely, and insert their ovipositors with the same readines that they did upon the contiguous heads that were not thus treated. I deem this experiment sufficient to put to rest the much mooted question with regard to the utility of lime as a shield against the wheat-fly.

A yet more prominent, and much more plausible mode of enabling the wheat to escape injury from the fly, is, sowing the seed at such times as will prevent its being in blossom at the period when the insect appears. With this view, it is recommended to sow winter wheat much earlier than was ordinarily done, that it may be so far matured the following season at the time of the appearance of the fly, as to be invulnerable to it; and spring wheat, so late as not to be in blossom until the fly has finished depositing its eggs. This plan has been much relied upon, on both sides of the Atlantic, and I have been heretofore disposed to regard it as probably the most feasible of any — though by avoiding Scylla we were in danger of Charybdis — for early sown winter wheat invites a return of the hessian-fly, and late sown spring wheat is almost certain in this vicinity to be attacked by "the rust" (*Puccinia graminis*). Numerous instances, moreover, can be adduced which tend much to support the utility of this measure. One of these, as strong as any that has come to my knowledge, I may here state. In a field of spring wheat of my own, raised in 1843, every kernel in the top of almost every head was entirely destroyed, whilst the lower two-thirds or three-fourths of the ears were wholly uninjured. I could account for this only by supposing that these heads were just beginning to be protruded from their sheaths as the operations of the fly were closing for that year; and hence confidently inferred that if that wheat had been sowed a few days later, it would have escaped entirely, or a few days earlier, it would have been entirely destroyed. By a reference to my Farm Book, I find this crop was sowed April 26th, and cradled August 10th, but no note was taken of the time when it was in blossom. I must confess, however, that my observations the present season have greatly diminished my confidence in the time of sowing as securing the crop from injury. Though I did not see the fly abroad until the 16th of June, it was then present in such swarms, and had already deposited its eggs so profusely, that I think it must have commenced appearing quite early in that month. It, moreover, continued to be abundant, until about the middle of July, and specimens were occasionally met with a month longer. Certainly if it is usual for it to be spread out over such an extent of time, it will be vain to rely upon the time of sowing, to insure a crop against its ravages. Some observations in the foreign accounts also throw light upon this subject. Mr. Shirreff says, in 1829 the fly appeared June 21st; "and from the vast numbers of them then seen, it is probable a few of them may have been in existence some days previous." Their eggs were seen June 23d, and must therefore have been deposited on the evening of the 22d. "The flies were observed depositing eggs on the 28th, and finally disappeared on the 30th of July, thus having existed through a period of thirty-nine days," and depositing eggs during thirty-seven of these days. I know not how Mr. S. could be certain that the fly had disappeared for the season on the 30th of July, for his account is dated the first day of August. For a few days only after their first appearance, he tells us, they frequented the couch-grass as well as the wheat. Was not this because there was not at that time a sufficient quantity of wheat in bloom to accommodate the number of insects that were then out? And Mr. Markwick distinctly states that it was after the grain had been harvested, that he found the larvæ in the wild oats. Were not the parent flies then obliged to resort to this plant, because all the wheat had become mature ere they had completed depositing their eggs? These facts certainly make it appear as though the fly is often abroad before the wheat commences blossoming, and continues till after it becomes mature.

Is there, then, no mode by which the flowering grain can be shielded from the ravages of the fly? This is a subject on which I have bestowed much thought; and I am not now prepared to tell the reader what *he must do*, but I will briefly inform him what *I shall do*, upon the first occasion that calls for it. A method is sometimes resorted to abroad, for saving grain fields from the depredations of certain insects of peculiar habits. A rope is drawn along over the grain, by two men walking at a brisk pace; which rope thus knocking against the heads of the grain, causes the depredators to drop themselves instantly to the ground, and it is a slow and tedious task for them to get up to the heads of the grain again. A similar process, but with a different apparatus, I contemplate employing against the wheat-fly. This apparatus is a light net made of gauze, three or four feet deep and one or two rods long; its mouth reaching the entire length of the net, and opening to a width of about eighteen inches. A small rope is to be stitched to the upper and another to the lower side of the mouth, reaching slightly beyond the net at each end, which is to be carried by two persons holding the ends of these ropes. If on closely examining the wheat-fields of my vicinity, from the time that the heads begin to protrude from their sheaths, the fly is found to be gathering in swarms in any one of them, I intend repairing to that field in the evening, when the insects will be hovering in such myriads about the heads of the grain, and, with an assistant, carrying the net so that the lower cord will strike a few inches below the heads of the grain, the upper one being held nearly a foot in advance of it, and about the same distance above the tops of the heads, by keeping the cords tense and walking at a uniformly rapid pace from side to side of the field, until the whole is swept over, I shall be much disappointed if *countless millions* are not gathered into the net, which is to be instantly closed whenever a pause is made, by bringing the cords together. It is now to be folded or rolled together into a smaller compass, and then pressed by the hands or otherwise so as to crush the vermin contained within it. This measure has been suggested to me, by observing the perfect facility with which the small entomological fly-net becomes *filled* with these flies, on sweeping it to and fro a few times among the heads of infested wheat in the evening. Of course this operation should be resorted to on the first appearance of the fly in numbers, and before its eggs have been deposited so profusely as will occur in the course of a few days. I feel strongly confident, that by sweeping over a field a very few times in the manner above described, the fly may be so completely thinned out and destroyed, as to be incapable of injuring the crop perceptibly.

With regard to destroying the fly in the earlier stages of its existence, only a few words will require to be said. Whoever has read the preceding account of the habits of this insect, must have been struck with a consciousness of the perfect facility with which that portion of the worms that are brought into our barns may be exterminated. It would seem as though Divine Providence had expressly designed to place a part of every generation of these insects directly in the hands of man, that he might destroy them or not, at his option. And Uncle Toby is so extremely benevolent, that he has uniformly carried them to the door, and said "Go away, little flies, go away; the world is wide enough for you and me both." Now it is scarcely necessary for me to say, that the screenings of the fanning-mill should invariably be closely examined, and if the minute yellow wheat-worms are numerous in them, the person should consider it a sacred duty which he owes to himself and his neighbors, to consign these screenings at once to the flames. If there are but occasional worms among them, let them be emptied into the hog-trough; but never empty them upon the ground, or among the straw of the barn-yard, unless they appear to be entirely free from these vermin. And now, if that portion of the worms which remain in the fields can also be destroyed, it becomes certain that we are at once and forever relieved from all farther solicitude with regard to future injuries which this insect can inflict upon us. But can this be done? It has been proposed to burn the stubble of wheat-fields after the harvest; and if this measure be resorted to at a very dry time in the autumn, probably some of the worms would be destroyed by it. But, so far as I have observed, they uniformly lie here in situations where they are surrounded with some degree of moisture, under damp and mouldy clusters of straw and stubble, or slightly within the surface of the ground. It would, therefore, only be those straggling individuals that were not in their usual haunts, that the transient heat caused by such a burning would reach. Would a turning over of the field with the plow bury them to such a depth, that they would fail of finding their way to the surface again? This is an important inquiry. It is very probable that the larva can work its way to the surface, from a greater depth than what the pupa can. Direct experiment only can determine accurately at what depth the insect, in both these stages, must be buried in order to destroy it. No information of any value can, therefore, be given upon this point, until such experiments are made.

DESCRIPTION OF THE CLEAR-WINGED WHEAT-FLY.

The importance of full and accurate descriptions of every one of the several parts of a natural object, in order that it may be identified with certainty, is strikingly illustrated in the present species. For some years it has been *supposed* to be identical with the English wheat-fly; but those who are aware of the large number of both plants and animals in Europe, that have analogous representatives in this country so closely resembling them as to have been in many instances for a long time considered identical even by accurate and experienced observers, could not but entertain doubts upon this point; and with the fifteen or twenty characters of this insect which could be gathered from different sources, I could still only say that our wheat-fly was *probably* the *tritici* of Mr. Kirby, some of its prominent peculiarities seeming even to conflict with the descriptions given of that species. For instance, all that we could gather respecting the form of the joints of the antennæ, was, that they were "*moniliform*"; and Messrs. Kirby and Spence, in their "Introduction to Entomology," define this term to mean "oval or globular joints, like a necklace of beads." Now the joints of the antennæ in our insect are oblong, and each has a marked contraction in its middle, thus approaching to an hourglass shape, a form the very reverse of "oval" or "globular." It was not until I saw the excellent figures and descriptions of Mr. Curtis, that I became well assured that our species was identical with the European.

The common reader will get the most clear and definite idea of the appearance of the wheat-fly, by being told that it looks almost exactly like the wheat-worm with wings and legs added to it. These members, however, are so very small as to be scarcely recognized by the naked eye, except when they are fixed intently upon the object.

The HEAD of the *female* Cecidomyia tritici (Plate 5, fig. 1) is of an orbiculate or flattened-globular form, with the *eyes* forming its periphery. These are large, occupying full two-thirds of the entire head. They are of a deep black color, and are separated from each other on the top of the head only by a slight and almost imperceptible cleft, so that when viewed in front they appear like a continuous broad black band surrounding the head, and interrupted only below at the mouth, thus resembling a horseshoe in their figure. The *face* is pale yellow. In its centre, and contiguous to each other, are two pale yellow tubercles or spherical eminences, more or less conspicuous, on which the antennæ are inserted, and which are by some regarded as forming a joint of these organs, in addition to the number commonly stated. The *antennæ* are of a deep brown or black color, less intense than the eyes. They are of about the same length as the body, and composed of twelve joints. Each joint (Plate 5, fig. *e*) is commonly oblong, with a marked contraction in its middle, a shape which is sometimes designated as 'coarctiform,' and is surrounded with a whirl or row of hairs near its base, and another near its apex.* The joints are ordinarily about thrice as long as they are broad, their diameter being but little less than that of the legs. They are connected together by a slender thread intervening between each joint, and about a fourth as long as the joints themselves. The two *palpi* are pale yellow, and clothed with shortish hairs : each is composed of four oval joints ; the terminal one being longer, but of the same diameter with the preceding.

The THORAX is of a pale yellow color ; its upper side commonly tinged with fulvous brown, which sometimes, though rarely, forms three vittæ or longitudinal spots forward of the middle. It is of an ovate form, its greatest breadth being immediately back of the wing sockets. Its vertical diameter much exceeds the transverse, as is common in most species of *Tipulidæ*, the breast jutting down far below the level of the head and abdomen. The *poisers* are oval, honey-yellow, their pedicels with a strong notch in the middle of their anterior sides.

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* Not unfrequently, however, singular anomalies occur in these joints. Thus in some the contraction will be so considerable as to cause the segment to appear like two globular joints slightly but distinctly separated from each other; whilst other segments *of the same series* are abbreviated and dilated, the usual contraction thus becoming obsolete, and the joint taking on a short cylindrical form. It would thus seem as though we, in the female, met with the twenty-four joints of the male antennæ in a modified or imperfectly developed condition ; that what appears as a single oblong coarctiform joint, is in reality two joints united. This would give but a single whirl of hairs to each joint, as is common in most of the species of this genus.

The ABDOMEN throughout is of an orange color, more inclining to red than to yellow. Its broadest part scarcely equals the thorax in diameter. It is of an ovate form, attenuated towards its tip, whence the two valvular sheaths of the ovipositor are often seen more or less exserted, and sometimes the apex of the ovipositor itself projecting between them like a fine slender thread. According to Mr. Curtis, by a slight pressure on the abdomen of the living insect, the ovipositor (Plate 5, fig. *f*) can be made to protrude, and may then be drawn out to nearly thrice the length of the body.

The WINGS are hyaline and colorless, appearing like thin plates of glass or mica, but reflecting the tints of the rainbow, particularly the violet, when viewed in certain directions. Their margins are densely ciliated with longish hairs, and their surface is covered with minute pubescence. The mediastinal or *submarginal nerve* is but slightly distant from the costal (marginal), and becomes confluent with it rather forward of the middle of the exterior margin. From its middle, it sends a small connecting nerve backward to the postcostal. The *postcostal,* which is the most conspicuous nervure of the wing, runs direct, or with but an insensible curve, to the tip of the wing. The *medial* is straight, and attains the inner margin at about three-fourths of the distance from the base to the apex of the wing. The *anal* runs nearly parallel with the inner margin, and, with a very sudden curve from its direct course, joins the margin near its middle. It gives off an obscure branch at its angle, which curves outwards and backwards, joining the medial, or rather, seeming (if the wing be moved so as to give a slightly different incidence to the light) to be continued onward, parallel with and contiguous to the medial nerve, till it attains the margin of the wing. The medial and anal nerves are very slender, and are often invisible, except in a particular reflection of the light. The former, especially, can seldom be distinctly traced, except towards its termination. These details of the neuration of the wing apply equally well to all the species of Cecidomyia that have fallen under my observation, save only that they are more distinstly traced in the others, particularly the larger species. At rest (Plate 5, fig. 6), the wings are laid one upon the other, reposing horizontally upon the back of the abdomen, and reaching about a fourth of their length beyond it.

The LEGS are whitish or very pale yellow, long and slender, of a cylindrical form, and of nearly the same diameter through their entire length. The coxæ (small joints by which the femurs are connected with the sternum), as they are directed more or less backwards, vary the point from which the legs seem to arise in different specimens when viewed from above. The femurs, tibiæ, and second joint of the tarsi, are all of about the same length. The third, fourth, and fifth joints of the tarsi (Plate 5, fig. *g*), are successively shorter; whilst the basal joint is the shortest of all, its length little exceeding its diameter.

All parts of the body and limbs are clothed with minute, slender, longish hairs.

The MALE differs so remarkably in its aspect from the female, and is moreover so rare an insect, that it has generally escaped the researches of observers. It would appear from Mr. Curtis's paper, that Meigen is the only one who has identified and given a description of this sex; and I should distrust my having any specimens of it, but that one of the flies hatched from the larvæ already spoken of as gathered in a wheat-field early in the spring, is a male (Plate 5, fig. 4); and a few of my other specimens manifestly coincide with this. In these the *antennæ* are at least double the length of the body, and composed of twenty-four joints of a very exact globular form (Plate 5, fig. *e*); each joint encircled with a single row of hairs, and separated widely from its fellows, the thread between being of about twice the length of the joint itself. The *abdomen*, instead of being of an ovate form, as in the female, is broadest at the base, and thence tapers gradually, though slightly, towards the apex; the terminal segment, however, being broader than the one or two preceding it, and of a reniform shape, with the lobes directed backwards. The male is also somewhat smaller in size: in all its other marks, it appears to correspond with the female.

Among the hosts of specimens of the female that may be met with, there will occur considerable variations in size, color, and some minor particulars. The common length, to the tip of the abdomen, is the twelfth of an inch, or slightly under this; yet I have measured recent specimens from the wheat-field, that were but half this size. The color seems to be more uniform in specimens taken from the wheat-field, than in those procured in other situations. It is of a lively orange-red, particularly upon the abdomen, where the color is most observed; but varies from that to amber or honey-yellow, lemon-yellow, and even to a cream-color. The specimens already spoken of as having been rasied in dried earth, are all quite pale; and it would hence appear as though these lighter colored varieties were caused by unfavorable circumstances in which the insect had been placed when in its larva state.

THE SPOTTED-WINGED WHEAT-FLY.

Another species of *Cecidomyia* (Plate 5, fig. 2), as the reader has been already informed, is frequently met with, associated with the *tritici* in fields of wheat. It is closely allied to the *tritici* in form and coloring, having like it an orange-red body, hyaline wings, pale yellowish-white legs, and twelve joints to the antennæ, identical with those of the *tritici* in their details. It is, however, readily distinguished from the *tritici*, as well as from all the other species of this genus, with only two or three exceptions, by having spots upon its wings. These spots are so conspicuous as to be recognized by the naked eye, even when the insect is flying. They are of a pale black or smoky color, and seven in number on each wing. Two, and these the most conspicuous from being commonly of a deeper tint, are placed upon the outer margin: one being at the tip of the submarginal nerve, where it unites with the costal; the other, half way between this and the apex of the wing. Both these spots reach across the costal cell, and oftèn slightly into the externo-medial. Another spot occupies the apex of the wing, at the tip of the post-costal nerve. Three others are based upon the inner margin, respectively at the apex of the medial and anal nervures, and at the axilla or base of the anal cell. The seventh spot is upon the disk of the wing, mostly in the outer middle cell, and is sometimes confluent more or less with one or more of the marginal spots. The nerves, when traversing these spots, are of a deeper black color than in other parts of their course, as are also the hairs which proceed from them into the fringed border of the wing. These spots are formed by a pigment in the membrane of the wing, the fine pubescence upon the surface being no more dense here than upon the other parts. The species under consideration is farther distinguished from the *tritici*, by invariably having the base of the abdomen, on its upper side, of a brown or blackish color. The thorax is often of a darker fulvous brown; and the breast is of the same color, instead of light yellow as in the *tritici*. The last joints of the feet, moreover, are commonly though not invariably black in this species, and there is often a broad black band at the base of the anterior tarsi.

The *males* have the antennæ composed of twenty-four joints, each encircled as usual with a row of hairs. These joints approach a globular form, but have, in common with those of the males of several other of our species, this striking peculiarity, namely, that through the whole series, though preserving the same diameter, they are alternately shorter and longer; twelve being compressed-globular or double-convex, and between each of these a very short cylindrical joint with convex ends.

This species is closely related to the *ornata* of Say (*Appendix to Long's Expedition*, p. 357), but is readily distinguished from that by its blackish antennæ, the color of which contrasts strongly with that of the legs; by the greater number of spots on its wings, and these spots not being "occasioned by the greater density of the hair of the surface in those parts." In the latter character it also differs from the *pictipennis* of Meigen, as described by Macquart; as also in not having the spots forming bands across the wings. If any description of the *maculipennis* of Stephens, in his catalogue of British insects, has ever been published, I have not met with it. That this species, however, exists abroad, is highly probable, from the fact that the specimens reared from wheat-worms by Mr. Markwick had "spotted and transparent wings," as he describes them, or "obsolete clouds" as they were termed by Mr. Marsham. Mr. Curtis calls attention to this fact respecting these specimens, apparently from a suspicion thus excited that another species existed. He says, "I am particular in noticing this, because the wings of Mr. Kirby's *C. tritici* are not spotted, nor are any individuals that I have seen; and excepting the *C. pictipennis*, which is larger, I know of no species of the genus with spotted wings."

The species under consideration, may appropriately be named and characterized as follows:

Cecidomyia caliptera. Orange-red; base of the tergum blackish: wings hyaline, with seven dusky spots: legs whitish; tarsi black at tips.

Length 0·05.

Var. α. Axillary spot of the wings wanting.*
β. Tips of tarsi whitish.

Specimens have been taken almost weekly, from the middle of June, till the fore part of September, in fields of flowering wheat, among the grass of plats contiguous to dwellings, and upon the windows of houses. I do not doubt but its habits are very similar and perhaps identical with those of the *tritici*, and that in proportion to its numbers it is equally destructive. The investigations of another year, may, I hope, enable me to furnish something more definite upon this most interesting subject.

SPECIES RESEMBLING THE WHEAT-FLIES.

We have what appear to be several species of cecidomyides, allied to our wheat-flies in size, in the number and form of the joints of the antennæ, and more or less in the colors of their bodies. Among objects so exceedingly minute, and so closely related to each other, a most patient and critical study of a large collection of specimens, both in their recent and their dried state, is indispensable, in order to trace out with accuracy and define with precision each of these species. Perplexity and confusion will be the inevitable result of a hasty or superficial performance of a work of this character. It is hence that I shall at present venture to name and characterize but two of these species, whose marks are so evident and distinct as to render their recognition comparatively easy, yet whose colors are so analogous to those of the clear-winged wheat-fly that they would be confounded with it by ordinary observers, unless aware of their distinctive marks. I am only acquainted with these species in their perfect state.

A few specimens occurred to my notice about the middle of the month of August, having the abdomen more tinged with red than in the wheat-flies, but commonly fading, when preserved, to a flesh-color or dull yellow; the thorax brown or blackish above, its sides dull yellow; legs blackish except at their bases, and poisers of the same hue; wings dusky, with their nervures more distinctly marked than in the wheat-flies. I would propose for this species a name alluding to the contrast between the color of the thorax and of the abdomen, in a dorsal view of the insect (Plate 5, fig. 3).

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* On a careful re-examination of all my specimens while copying this paper for the press, and a reference to the dates and situations where each was collected, I discover that all those which have been gathered from wheat-fields are of this variety, having but six spots; and farther that the spot on the inner margin nearest to the base of the wing is situated *in the middle of the anal cell*, thus leaving the *space about the apex of the anal nervure* perfectly *hyaline*. Should the particulars here specified prove to be permanent and constant, as I believe they will, it must lead to a separation of this as a distinct species from the *caliptera;* in which event, the specific name *cerealis* might appropriately be bestowed upon the real wheat-fly having but six spots.

> *Cecidomyia thoracica.* Red: thorax above blackish-brown: legs and poisers blackish: wings dusky.
>
> Length 0·05.

A much more abundant species, and very closely related to the preceding, occurs from the last of July till the middle of September, and perhaps later. Its legs are dusky, but not of so deep a tint as those of the *thoracica,* from which, moreover, it is readily distinguished by having invariably a fulvous-brown or blackish spot at the base of the abdomen on its upper side. The base and sides of the thorax are of the same color with the abdomen, namely, red, or in old specimens dull pale yellow; the upper side, forward of the scutel, being brown. This species (Plate 5, fig. 5), may be named and characterized as follows:

> *Cecidomyia tergata.* Red: thorax anteriorly and spot at base of tergum brown: wings, legs and poisers dusky.
>
> Length about 0·06.

Both the preceding appear to be quite distinct from any of the European species that have been described.

In closing this paper, I have to apologize to the editors and patrons of the Journal for the delay which it has caused in the issue of the present number. I trust the paper itself may be found sufficiently acceptable to atone in some measure for this delay, its completion having required an amount of time far exceeding what I had anticipated.

NOTE. The insect, Plate 3, fig. 2, of the first volume, the name of which was omitted at that time, is the *Purpuricenus humeralis* of Fabricius.

SALEM, N. Y. October 8, 1845.

NEW PUBLICATIONS.

Travels in North America, in the years 1841 – 2; with Geological Observations on the United States, Canada and Nova Scotia: By Charles Lyell, Esq. F.R.S. In 2 vols. 12mo. Wiley & Putnam.

It is rare, very rare, that a traveller, whose range of thought and previous philosophical preparation so eminently qualify him for the performance of a tour of scientific inquiry, as in the case of the author of these volumes, writes out for the public his sentiments and the results of his observations. Mr. Lyell, if we are rightly informed, was educated for the bar; but having a predilection for the more attractive and fascinating pursuits of the sciences, he has devoted himself with astonishing zeal to their cultivation. Bringing an acute and well regulated mind to bear upon them, he has not only made them popular, but useful : he has not only kept up with their advance himself, but has actually pushed them ahead.

We must say one thing more of the author : he has not been a mere fancy dealer in science, a sentimental versifier of its beauties; but has taken off his coat, and worked like a day laborer at twelve shillings a day and found. Not that he is at all insensible to the beauty, or indifferent to or unacquainted with the grandeur of his favorite pursuit, but truth to him has been of more value; and looking at the nature of the case, he wisely judged, that to attain his end, the only road to it was by the most patient and unwearied investigations in the field. Of all the sciences, geology has been Mr. Lyell's favorite department, and the study of others has only been made auxiliary to this. It was to prosecute this branch, that led him to visit us, and make the tour of this country. His work, however, appears in the form of travels; and in them we find Mr. Lyell's views of men and things, of people and institutions, intermixed with geological dissertations, the latter appearing rather as an incident than the main subject of discourse; yet in some parts of his book, he systematizes his observations, and they appear more in the light of a principal subject. The interstratification of his geological speculations with those upon our domestic and national institutions, gives a pleasing variety to his work. It contains a sufficient amount of personal incident to carry along our interest with the writer, while his good sense has ever kept him above the relation of those trifling or strange adventures, which many travellers are so very fond of retailing. Again, Mr. Lyell, we are pleased to say, has gratified every body by the frank expression of his opinions, which altogether are highly flattering to us as a people. To Americans, who have so frequently had to bear not a few cuffs and a great many sneers, some haughty and some subdued, this treatment seems so kind, that we are almost inclined to make a low bow to the author, and say 'God bless you sir.'

Mr. Lyell landed in Boston, August 2, 1841, after a short passage from Liverpool of twelve days and a half, and we will make a record of his first observations. " The heat here is intense; the harbor and city beautiful; the air clear, and entirely free from smoke, so that the shipping may be seen afar off at the end of many streets. The Tremont Hotel merits its reputation as one of the best in the world. Recollecting the contrast of every thing French, when I first crossed the Straits of Dover, I am astonished, after having traversed the wide ocean, at the resemblance of every thing. I see and hear things familiar at home. It has so often happened to me, in our own island, without travelling into those parts of Wales, Scotland or Ireland, where they talk a perfectly distinct language, to encounter provincial dialects which it is difficult to comprehend, that I *wonder at finding the people here so very English.*"

It will be impossible for us to trace Mr. Lyell's tour through the United States in a continuous line, or to give his views of the American people, and of the structure of the country at large. We are necessarily limited to a very meagre sketch, and can only give here and there, without much connection, a few of the results of his observations. We have, in a few instances, to dissent from his views.

Some may wonder how Mr. Lyell has been able to acquire so much geological information in so short a time. This we are able to explain, we believe, in a manner which will be satisfactory to our readers. The Geological Survey of New-York, and of several other States, was nearly completed at the time of his visit. The several gentlemen who had charge of them, were still upon the ground, and every locality of interest was well known to them. To those points, then, which yielded the most ready information, the author was conducted; and from their disclosures, and from information freely furnished by the geologists themselves, Mr. Lyell has been able to compile an interesting and correct account of our geology in a comparatively short time. These remarks, in explanation of his geology of this country, are due to the American geologists.

Mr. Lyell's first object, on landing upon our shores, was to compare the New-York rocks with the Silurian system, which had been so recently brought out by Mr. Murchison. In a few days, then, we find the author upon a tour across the State of New-York. This tour was designed to embrace an examination of the New-York system, up to the Coal measures of Pennsylvania. The line of route was by that of the canal to Niagara Falls, and thence by Genesee valley to Blossburgh. This tour gave him a full opportunity to see the entire series of rocks, from the Calciferous sandstone to the Coal measures, and it is gratifying to find him confirming step by step all the conclusions which had been previously obtained by the New-York geologists.

Mr. Lyell briefly refers to the New-York survey, in the following words (vol. i, p. 13): "The Legislature of New-York, four years ago, voted a considerable sum of money, more than 200,000 dollars, or 40,000 guineas, for exploring its natural history and mineral structure; and at the end of the first two years, several of the geological surveyors, of whom four principal ones were appointed, reported, among other results, their opinion that no coal would ever be discovered in their respective districts." "This result," observes Mr. L. in continuation, "occasioned no small disappointment, and even some complaint; yet it was really of great benefit to the people, in checking the rashness of private speculators. Large sums, for the last twenty years, had been expended or squandered in trials for coal in rocks below the Carboniferous series; and there can be no doubt," he adds, "that the advantage derived to the resources of the State, by a cessation of needless expenditure, is sufficient to indemnify the country on mere utilitarian grounds, for the sum so munificently expended by the government on geological investigations."

Another remark of Mr. Lyell, in this connection (vol. i. p. 15), will, we think, interest our readers. "In the course of this short tour, I became convinced that we must turn to the *new world*, if we wish to see in perfection the oldest monuments of the earth's history, so far at least as relates to its earliest inhabitants. Certainly in no other country are these ancient strata developed on a grander scale, or more plentifully charged with fossils; and, as they are nearly horizontal, the order of their relative position is always clear and unequivocal." Again (p. 17), "They who are accustomed to connect the romance of their travels in Europe or Asia, with historical recollections and the monuments of former glory, with the study of master pieces in the fine arts, or with grand and magnificent scenery, will hardly believe the romantic sensations which may be inspired by the aspect of this region, where few points of picturesque beauty meet the eye, and where the aboriginal forest has lost its charm of savage wildness by the intrusion of railways and canals. The foreign naturalist indeed sees novelty in every plant, bird and insect; and the remarkable resemblances of the rocks, at so great a distance from home, are to him a source of wonder and instruction. But there are other objects of intense interest, to enliven or excite the imagination of every traveller. Here, instead of dwelling on the past, and on the signs of pomp and grandeur which have vanished, the mind is filled with images of coming power and splendour. The vast stride of one generation in a brief moment of time, naturally disposes us to magnify and exaggerate the rapid rate of future improvement. The contemplation of so much prosperity, such entire absence of want and poverty, so many school-houses and churches rising everywhere in the woods, and such a desire for education, with a consciousness that a great continent lies beyond, which has still to be appropriated, fills the traveller with cheering thoughts and sanguine hopes."

Something of the spirit of Mr. Lyell's volumes may be gathered from these extracts. We can spare room to copy but few of the beautiful paragraphs with which they are every where interlarded, some on subjects of a purely scientific character, some on the passing events of the day, and many upon the institutions of our country. We cannot, however, refuse ourselves the pleasure of one more extract, which exhibits a candor and frankness on his part, such as stands in bold contrast with the character of other English and foreign travellers who have published journals of their tours through the United States. "Travellers must make up their minds in this as in other countries, to fall in now and then with free and easy people. I am bound, however, to say, that in the two most glaring instances of vulgar familiarity which we have experienced here, we found out that both the offenders had crossed the Atlantic only ten years before, and had risen rapidly from a humble station. Whatever good breeding exists here in the middle classes, is certainly not of foreign importation; and John Bull, in particular, when out of good humor with the manners of the Americans, is often *unconsciously beholding his own image in the mirror*, or comparing one class of society in the United States with another in his own country, which ought, from superior affluence and leisure, to exhibit a higher standard of refinement and intelligence."

A subject which Mr. Lyell has discussed, is that of the drift, or the comparatively recent formation which embraces those of the period coincident with that of the true drift, and of the deposits which were formed quietly and subsequently thereto. We shall give his remarks, inasmuch as the subject is especially interesting, and cannot be too thoroughly contemplated. It is proper to premise that the entire formation consists of sand, coarse gravel and loose rocks, and of fine argillaceous and siliceous sediments, which in some places contain fossils. These deposits rest upon the surface rock, the upper layer of which is scored and smoothed, and sometimes polished; the scores and grooves having a northerly and southerly direction, differing many degrees, however, sometimes westerly and sometimes easterly: the variation in most cases seems to be produced by an opposing barrier, as a range of mountains; but this is not always the case, for in some instances these grooves and scratches pass obliquely over steep mountains.

Mr. Lyell, in giving his views upon this formation, occupies an entire chapter, from which we extract the following: "This formation occupies the vallies of the St. Lawrence, Champlain and the Hudson: it rests every where upon a grooved surface, the direction of the grooves northeast and southwest; and it is remarked that the blocks or boulders have been transported southwards along the same lines as are marked out by the direction of the furrows. The inference, therefore, is, that there is a connection between the grooves on the solid rock, and the boulders found upon it; or, in other words, the agency by which boulders have been transported, and the grooves made, is one;" and that agency is attributed by

Mr. Lyell to floating ice, within which stones were fast frozen, that acted like gravers, and cut the rock as the iceberg floated along. Thus the grooving of the rocks, the transported beds of boulders, gravel and sand, and the fine clay connected therewith, are all the product of transport. This we infer especially from a remark on page 128 : "Nothing, however, is clearer, than that here, as well as in the valley of the St. Lawrence between Kingston and Quebec, the marine shells of recent species are referable to the same geological period as that to which the boulders belong." This period embraces all, beginning with that power which scored the rocks, and ending with the deposition of sand forming the upper part where the deposits have not been disturbed.

We, however, regard the matter thus : There was a force which moved the rocks, coarse and fine, and grooved the floor upon which they moved from north to south. This force we consider to have been *sui generis ;* that is, distinct from that which carried boulders subsequently, and which contained the then living animals that we now find in the clays and sands of the vallies named above. There is enough in this first movement, to entitle it to the character of a period, and to stand by itself. To this succeded a period of quiet, during which the clays and sands were deposited, as in most cases where the structure and character of the beds is the same ; for these are perfectly fine sediments, consisting of extremely fine layers of clay, alternating with extremely fine sand, the entire thickness of the whole amounting to over one hundred feet. This we say was the product of a period of perfect quiet, during which marine animals lived ; and so perfectly quiet was it, that the thin fragile shell of the *Terebratula psittacea* preserves both valves in contact, and still attached by the hinge : indeed, perfect tubes in the sand, lined with calcareous matter, and which are coeval with the time of deposit, remain to this day. We separate this quiet period from the preceding, which was one of turmoil and violence ; and, we think, justly, because the two are so dissimilar in character. At some places, as at Port Kent and Chimney point, the fine sediment of clay rests upon the grooved surface of rock : at other places, there are beds of stones, boulders, gravel, sand, etc. upon the grooved surface; and these are the masses that have been borne along with, and formed a part of, the drift current. But upon these very drift beds reposes a fine sediment of clay and sand alternating, in which it is rare to see a stone at all, and this is coincident in formation and time to the clays we have just spoken of: it was deposited in quiet tranquil waters. That these periods succeeded each other, there is no doubt; that they were short, is equally plain: still we say distinct, and forming two separate periods. Subsequent to the period of quiet, there seems to have been another period of disturbance, as admitted by Mr. L., during which the upper portions of the clays and sands have suffered denudation. The formation at Port Kent, where the fossils are found, is entire, and the same may be said of that at Beauport near Quebec.

Another point, to which allusion has been made already, is the power that was concerned in transporting the boulders, which, as they moved along, scored the rocks: this is all attributed to icebergs. To this view there is this objection, that the surfaces are polished, and it is highly probable that the bottom of an ocean where icebergs float is always covered by a thick mantle of debris; but more especially does the fact militate against the iceberg theory, that the entire soil has been moved forward *en masse* — shoved along in a body, from one formation, over an intermediate one, to another, as may be seen in the Helderberg range. We have, however, stated on several occasions long ago, that boulders were dropped apparently from icebergs during the period of quiet which we recognize; and these are the boulders we have seen in the deposit at Beauport, in the midst of shells all entire and perfect as they were when living. However, the subject of drift is one of great difficulty, and we are not disposed to trouble our readers farther with it.

We recommend a perusal of these volumes to our friends, especially those who wish to acquire geological information, and who at the same time would like to know what are Mr. Lyell's views of this country.

TRANSACTIONS OF THE NEW-YORK STATE AGRICULTURAL SOCIETY.*

In the last number of this Journal, we published a review of this work, in which we avoided pointing out what we considered as faults, because we did not wish to bring pointedly before the public the errors of individuals, but hoped that what we did say might lead the readers of those volumes to examine cautiously what they contained, and sift for themselves the true from the false. We looked upon our article with no small degree of satisfaction, as one which gave sufficient praise, and found as little fault as possible. We fondly thought that no one could object to our review. But, alas! for our hopes, a writer in the Cultivator for September censures us because we did not expose what we thought wrong more pointedly. Since we are called upon thus publicly to give our views plainly, we feel that it would be injustice both to ourselves and the public to refuse. Our intention, then, in taking up these volumes again, is to answer the call of the writer in the Cultivator, and to state plainly some of those things which we found fault with before; and also to point out some of the contents of the work, "which had better been left out, because it has no connection with agriculture; and some which had better never been written, for it is full of error."

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* We perhaps owe an apology to our readers for bringing these volumes again before them, which we hope they will find in the following. In the September number of the

But before entering upon this, we cannot refrain from expressing our surprise at the bold charge of the writer referred to, that, in speaking of the men who had been selected to deliver the annual addresses at the Fairs, we alluded particularly to Mr. Bancroft. If the writer had carefully read what we did write, he would be troubled to find in what we said any thing which could by any possibility allude to any individual. We admire Mr. Bancroft as much as any

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Cultivator, appeared a paper signed "Senex," taking us severely to task for our mild review of the "Transactions." As soon as we received it, we directed a note to the editor of that paper, requesting him to reserve room for us, in the October number of his Journal, to reply. We wished to answer the writer in the paper he had chosen to bring us before the public in, so that the readers of his unprovoked article might have the opportunity of reading our defence. To our letter we received the following reply:

> ALBANY, September 25, 1845.
>
> DEAR SIR — I have just now, for the first time, seen your note of the twelfth instant. It was probably laid on my desk when first received, where it has laid till this time with a mass of other papers waiting my examination. It appears to me that your own Journal would be the more suitable place to sustain the criticisms therein made upon the Transactions. I cannot conceive that you have any just claims upon the Cultivator, so long as the work in which the controversy commenced is under your own control; and I must, therefore, respectfully decline the publication of your proposed reply to Senex.
>
> Respectfully yours, LUTHER TUCKER.

Now *our* readers will judge of the necessity of using our own columns for this purpose. As to "controversy," we admit nothing of the kind into this Journal; but when we are challenged to duty, we are always ready.

man who knows him only through his works; and we said no word which could be considered, even by implication, as disparaging his address. Why then are we made to appear before the public as at variance with him? This question can best be answered by the writer who has chosen to place us in this position. We do not believe that Mr. Bancroft considered himself personally alluded to, if he ever gave himself the trouble to read our review. We regret sincerely that such a charge should so causelessly be made against us, and we regret as sincerely the necessity which is laid upon us to answer the call to expose the errors of the volumes published under the auspices of the State Agricultural Society; and in doing this, we may do even more than we merely hinted at before.

1. What are the "Transactions" of a Society? We had always supposed that in this word were included simply the doings of such a body; its business; reports of its meetings; papers read before it, relating to the objects of its labors; correspondence, etc. But what have we in the "Transactions of the New-York State Agricultural Society"? Not only these, and others that might be considered as the property of the Society; but we find also in these volumes papers, which, we will presume to say the Society as such never knew the existence of till they found them here. If we were surprised at them, how much more must the members of the "New-York State Agricultural Society" have been surprised when they they saw the "Transactions" assuming the form of a volume of *six hundred and seventy-one pages.* Let no one sneer at this, and call it picking for straws. We are aware that some one, in imitation of "Senex," may ask us for our instances of such papers in these volumes; and we are ready to produce our instances : but whilst we select them, let not the authors believe that we are finding fault with them. We are only saying that their articles had mistaken their place, or some one for them, when they got into the volumes before us. To the point, then, since it must be so; and we will not go back farther than the year 1843, inasmuch as the volumes previous to that year are so modestly small as to tempt us but lightly to the search. We take then the two last years' "Transactions," 1843 and 1844, which have been politely furnished us by the Secretary. One fact, however, must here be stated, before we produce these instances of what ought not to be here, and that fact is this : From these volumes have been rejected many papers which did form a

very important part of the "Transactions." Such are the Reports of certain Committees, at the State Fairs. These reports had been prepared with great labor and care, and yet were thrown out to make room for other matter which had no proper place in these volumes; and these reports we regard — ignorantly perhaps — as essential portions of the Transactions of this Society.

We ask the reader to turn to the following articles, as we specify them from a mere hasty examination of these books.

In the volume for 1843, page 241, we find a paper occupying 86 pages, with this title: "The Geological Survey of New-York, its influence upon the productive pursuits of the community." We shall speak more at large of this paper under another head. We only introduce it here as belonging to this head also; for we have the best of reasons for saying, that till this paper was seen in this volume, it was a stranger to the Transactions of the Society. We shall give Mr. O'Reilly's apology for this article farther on.

In the volume for 1844, page 61, is found an article entitled "Analysis of Soils," by Willis Gaylord; and page 118, one entitled "Rotation versus Summer Fallowing," by the late Willis Gaylord.

Now let not Senex charge us with slandering the dead, as he charged us with attacking Mr. Bancroft. We are saying nothing now of the late Mr. Gaylord, although we might find fault with some things in his papers; but it is with the book containing his articles, we have now to do. The compilers of the book say, in a note to the first article, "This paper was one of the last productions of the late Willis Gaylord, and was found on his table immediately after his death, which occurred on the 27th of March, 1844," etc., and then it is engrafted on the Transactions of N. Y. S. Ag. Soc. Now why are they here? Is it replied, that although they did not belong to the society, yet they may be useful to the farmer, and are therefore published here? The same excuse might be applied in the case of Loudon's Encyclopedias, or Liebig's works, or Johnston's, or Boussingault's, or any of the writers on agriculture, including the Cultivator, the Agriculturist and the American Quarterly Journal of Agriculture and Science, particularly the latter. But still farther:

On pages 210, 243, 255, are long extracts from the transactions of the agricultural meetings held during the preceding winter in the city of Albany. Why not give some from the Farmer's Club in

New-York, and similar institutions throughout the country? We know not.

On page 343, "Chemical Examination of the Rice Plant and Rice Soil of South Carolina. By Charles U. Shepard, M. D. &c." This same article was published in this Journal, in the month of January, 1844, as an extract from the Southern Agriculturist, in which paper it first appeared; and was reported as part of the Transactions of the Agricultural Society of Winyaw and All-Saints, in South-Carolina. Now by some means it becomes, without one word as to its source, part of the Transactions of N. Y. S. Ag. Soc.

But we notice, also, a very important part of the Transactions wanting. We refer to the action taken by the Society in reference to the introduction of agricultural studies into the common schools. There is some mistake here, something wrong. We think it would have been as well to have left out some things that do not belong there, and supply their place with some that do. This subject is only incidentally noticed in the volume; whereas, considering the amount of interest which has been for some time past felt in it, we think more notice should have been taken of it.

2. We have occupied more space than we proposed, in considering the foregoing point. We shall be more brief in the rest. In giving our opinion of so large a work, it cannot be expected that we should point out all that is wrong. If we give prominent examples, it must be sufficient. We are complained of, then, because we said there were portions of these books which "had better been left out." We recur to page 241 of the volume for 1843, "The Geological Survey of New-York," &c. Do not let us be understood as questioning the use of geological knowledge to the farmer; but it is only a particular kind, however, which can benefit him, and that not of fossils. Of what importance to him are these 86 pages of palæontology? Besides, the figures of these fossils had been already given by the State three times, and once in Silliman's Journal. There is nothing, in the whole character of the article, in the least agricultural. The subject is only referred to twice, and that only incidentally.

But the Secretary for that year makes an apology for the article being introduced, as follows: "It is due to Prof. Hall, to state that this paper was drawn up by him, by request, for the State Agricultural Society; less time being allowed him than is justly required for the preparation of an essay of this important character," etc. But the executive committee thought best to publish it, although having no bearing upon the objects of their association. As well might they have published a paper on volcanoes and earthquakes. We do, indeed, wish that our farmers were better informed in those branches of geology which are calculated to advance their prosperity, and we observe with pleasure that there is yearly an increase among them of this kind of knowledge; but they will be puzzled to see the connection between pictures of fossil shells, and their noblest of pursuits. An article on agricultural geology might be written, which would deserve a place in such a work as the "Transactions," but we do not find it here.

3. We said "some had better never been written," because in point of science it was false. And not to weary our readers, who, we fear, are already tired of this discussion, we will examine but one article, commencing on page 425 of the volume for 1843.

In discussing the question, where the food and clothing for the "countless myriads" of the human family must come from, it is said:

"The atmosphere, and not the earth, is the great storehouse for vegetable and animal food, designed for immediate use." Page 427.

From this and what follows, we conclude that Mr. L. has read Liebig, and adopted his theory without question, as regards vegetable nutrition; but this is taking but a one-sided view of the question. If it had been said that the atmosphere is the great storehouse of *carbon*, this might be true, and it might not; for although they undoubtedly derive much of this substance from that source, they as unquestionably do also draw much from the soil they grow in. Else why does the farmer add, year after year, organic matters to the soil? It can not for a moment be believed that all the use of manures is to restore the salts of which the earth has been deprived. If this be true, would not the proper course be to apply them to the surface, when the gases would be immediately dissipated through the air, to be taken up by the leaves of plants? But this is not the proper course. They are buried, and the gases, as they are produced, are absorbed by the porous earth, ready to be carried to the roots, or taken up by them as they find them in their progress. That these gases are absorbed in this way, is evident from one fact, that when the carcase of any animal is covered with a slight quantity of earth, none of the putrifying odor is perceived, which is so powerful when this process takes place above ground. And is all this amount of vegetable food of no use till it escapes and mingles with the atmosphere? We can not believe it. That a seed will germinate and grow in a soil utterly destitute of organic matter, experiments prove beyond a question; but will they attain perfection? On the contrary, they soon die, and no soil is productive which does not contain a considerable proportion of organic matter.

Do plants obtain their other organic constituents from the atmosphere? The same reasoning will hold good in respect to these, as in the case of carbon. But our space will not allow us to go into a lengthy discussion of these points. The reader is referred to the various works on these subjects. How the atmosphere is the great storehouse of *animal food*, we confess ourself utterly at a loss to understand. Any thing stored up there, we apprehend, would be light food for man or beast, unless the line be true we wot of when a boy about the chameleon:

> "I saw it eat the air for food."

Our author carries out the same idea farther, on the same page, where he says that "about 97 per cent of the solid structure of all cultivated plants, and animals, except their bones, is derived from air and water." In this he includes the carbon, which constitutes from 40 to 50 per cent of plants. But setting this aside, as, to say the least, a doubtful matter, we must reject also the water which escapes whilst plants are drying; and, what is the fact? Johnston says the ash of vegetable productions varies from 1 to 12 per cent of their weight; and according to Sprengel, 100 lbs. of the following plants, when dried in the air, left of ash,

Turnip - - -	7·05 lbs,	Lucerne - - - -	9·55 lbs.
Carrot - - -	5·09	Red clover - - -	7·48
Leaf of do. - -	10·42	White do. - - -	9·13
Parsnip - - -	19·76	Rye grass - - -	5·30
Cabbage - - -	7·55		

"About 97 per cent" ought to have a wide range, to include these and numbers of other vegetable products. Mr. L. unfortunately includes *animals* in both of the above extracts. With regard to them, the fact is by no means evident, and we think is without foundation. That there is an abundant supply of carbon in the air for the purposes of vegetable nutrition, is true, but is it used as he thinks?

But he proceeds to show how this carbon, floating in the atmosphere, may be seized and converted into "wheat, butter, cheese and pork."

"Gentlemen, I have in this glass water taken from a well near my residence in this city, such as is used by my family and others. You see it is quite clear, though I suppose it holds in solution, among other earthy ingredients, a portion of lime. I will now breathe into this water, and see what, if any, effect will be produced. You see the water is changed into a milky whiteness." Page 428.

When we first read this, we could hardly believe our eyes. It is a common experiment to dissolve quicklime in water, and breathe through it, to show the production of carbonate of lime by the union of the carbonic acid of the breath with the dissolved lime; but that the water of wells ever contains a solution of *pure lime*, we were ignorant. The water of wells and springs often contains the muriate, sulphate and carbonate of lime, constituting what is called hard water, but the breath could not have any effect upon these to produce the "milky whiteness." Whence then came the lime in this well? We can not believe for a moment that Mr. Lee was practising a piece of jugglery upon his audience, nor can we account for the source of the lime, having never seen nor heard of a case of the kind. But he accounts for it, by saying, that when in the state of a carbonate, it was decomposed by the action of the living and growing plant (page 429), and dissolved by rain water, and then carried down through the earth to the well from whence it was taken. Yet he says more, that after this decomposition, "the free lime whose carbon has gone to build up a vegetable, takes up another, and still another portion of carbonic acid." Of course, when it reaches the well it will be a carbonate, or some higher compound of lime. As to this decomposition, and the appropriation of the carbon to the nourishment of plants, we can only say it is a new theory to us of the action of lime.

"At night, plants consume no food, or very little, but digest what they imbibe during the day" (page 429). We had always understood the fact to be directly the opposite, that the light of the sun was the great agent in carrying on, or at least assisting the digestive functions of plants. During the day, they absorb carbonic acid and give off oxygen, the carbon being separated by the chemical action of light; at night, the carbonic acid is given off unchanged. The same is found to be the case when plants are excluded from the light in the process of blanching. A still stronger argument is to be derived from the fact, that in extreme northern latitudes, during the summer, which is all day, plants grow with great vigor and rapidity. How do they contrive to do this without any night to digest their food in ?

Our author comes, on this same page, to the consideration of ammonia, and its absorption by water, and says, "It is the ammonia in rain water, that imparts to it its peculiar softness in washing the hands or clothes." Then cold water should be softer than hot water; for although water when cold will absorb a large quantity of ammonia, it will lose it when boiled; but we have stated above, that the hardness of water is caused by the presence of salts of lime; when these are absent, as they are in rain water, it will be soft.

Again, "It is the ammonia that escapes from putrifying substances, that causes their offensive smell. But who does not know the difference between the bracing, agreeable smell of *hartshorn*, and the loathsome, sickening odor of a putrifying animal carcase? Ammonia is produced during the decomposition of animal matter; but this putrid smell arises from the compounds of carbon, phosphorus and sulphur, which are also generated. Again, "It is the ammonia in rain water, which causes it to putrify in some degree." The only three substances there are oxygen, hydrogen and nitrogen; but no combination of these will give the smell of putrefaction.

Mr. L. recommends the use of charcoal, and explains its action thus: "It will absorb 90 times its bulk of ammonia, and will give it out slowly to the vital attraction of the roots of plants." What is meant by this "vital attraction?" Suppose a piece of charcoal in the ground, saturated with ammonia; if the root of a plant come in contact with it, how far will this "vital attraction" act? We do not believe it will act at all beyond the mere point of contact, and that is on the outside where there is no ammonia. How then does the charcoal act, is the question. The answer is, if buried in the ground, it will be of little or no use; but if applied to the surface, where it is exposed to the air and heat of the sun, but where the roots of plants can not reach it, it will act thus: During dry weather it will absorb ammonia from the atmosphere, which ammonia will be washed out and carried down to the roots of plants by the first rain that falls upon it, for water has a much stronger attraction for it than the charcoal has; again being dried by the sun, it goes through the same process. This we conceive to be the true action of this substance; but as to its being a very active manure, under any circumstances, we have no conclusive evidence. The result of experiments, as far as we have noticed, is not decisive.

We pass over a number of other points which we had designed to notice, as well as the portion of the address which treats of wool-growing. On the latter subject we only hazard one recommendation. Mr. L. advises, as one means of increasing the growth of wool, to keep "the animal warm in winter," etc., and "stimulate, with the elements of wool, the organs which secrete this valuable covering of the sheep" (page 432).

These, we have long been aware, are favorite ideas of our author. But is it according to the analogy of nature, to keep any animal warm, in order to produce an increased length or fineness of covering? Those which occupy the colder regions of the earth have uniformly the finest covering, and the most abundant, and it also strikes us that these degenerate when they are brought into warmer latitudes. We merely give this as our individual opinion, drawn from the fact above stated. And as Providence ever provides for the circumstances in which his creatures live, to give them a covering according to their need, we infer that sheep would have a longer and a finer fleece exposed to constant cold, than if kept warm through the winter. We know of no facts in the way of experiments tried to determine this point; nor, we presume, does Mr. L.

But we forbear. We think enough has been said to confirm our formerly expressed opinion, "that much had better been left out, because it has no connection with agriculture; and some which had better never been written, for it is full of errors."

We must repeat here our former remark, that, as a whole, the volumes are highly creditable to our State Society. A little more care should be used to keep out error and false science, and to make the work strictly agricultural.

Let us repeat, and so as to be distinctly and correctly understood, that we have not alluded to any individual in our remarks, in regard to the orators at the annual fairs. If farmers need puffing to convince them that theirs is the highest and proudest of human pursuits, then let them have it. At the same time, we do know that they need information, and they love to hear that which expands their minds and ennobles their hearts, and teaches them how to make knowledge profitable.

The Botanical Text Book: By Asa Gray, M. D., Fisher Professor of Natural History in Harvard University. Second edition, 1845.

This work is a volume of five hundred pages. The first edition was excellent, and the second is a great improvement. It is illustrated by more than one thousand *woodcuts*, which enable the student readily to apprehend the delicate points of structural and systematic botany. It maintains the doctrines of the Natural System, with great clearness, beauty and power.

It is ever interesting to trace the progress of science. That which has any just claims upon the regards of men, goes onward in its useful course. That which is fanciful, hypothetical, or useless, sinks away and is forgotten. Linnæus, who is regarded as the father of scientific botany, died in 1778. It was in 1751, that he published his *Philosophia Botanica*, which contained the principles of a *philosophic* study of the vegetable kingdom. The incorporation of this work in *Rose's Elements of Botany*, which was published in London in 1775, greatly extended these principles. This was an era for botany in England. In 1753, Linnæus published his *Species Plantarum*, being an "accurate and complete digest of botanical knowledge" at that time, containing more elegant and precise descriptions, under a greatly improved form, than had ever appeared, and embracing all the then known species, being between seven and eight thousand: at this hour, the number of described plants is estimated at one hundred thousand, and the genera near seven thousand; and the *Species Plantarum*, in the hands of the successors of Linnæus, has become a huge work of several volumes.

In 1807, Sir James Edward Smith, so long the distinguished President of the Linnæan Society in England, published his "Introduction to Physiological and Systematic Botany," a work which at once became the text book and standard authority of botany in that country. This work was republished, from its second edition, at Boston, in 1814, with Notes by J. Bigelow, M. D., who has for a long time been ardently engaged in the pursuits of botany in that part of our country. This republication was an era in our country in botanical science; and yet at what a vast remove from the philosophy of botany, as presented in the *Botanical Text Book*, is this work. It is read with interest at this time for its knowledge, but evidently belongs to another age, even to the *dark ages* of botany.

The Botanical Text Book is the *posting up* of the results of revolution and progress in the study of the vegetable kingdom. *Organic*, or structural botany, has been introduced within a few years, and now forms an essential part of the subject. It can never be removed from its place, even if it should receive modification and improvement. This has led to no inconsiderable change in the *technicalities* of botanical language, as well as in the consideration of the objects themselves.

The adoption of the *artificial method* by Linnæus, was the result of necessity. He had not a sufficient knowledge of plants, to bring them into their natural families, and to exhibit their affinities. It was the work of minds far inferior to his, to recognize these relations, when the multitude of plants had been examined, and the vegetables of all spheres and climates had been ascertained; but even this work was begun by Linnæus himself, for no one better understood the proper course of botanical investigation. The *natural* orders were first arranged by him, for he distributed the known plants into sixty-five natural associations or orders. To depreciate the labors and results of Linnæus, is folly ; to rob him of his untarnished glories, is at this day impossible. Some have indeed sneered at his works, but the *paw of the lion* need not be lifted to annihilate such sciolists. The wonders of vegetable structure had not been unfolded by the microscope, and some of the more obvious forms of organization had not yet been appropriated to their legitimate use. The author of the Text Book has been placed on an eminence, and his vision greatly aided. Standing in this position, he has unfolded the scenes spread out before him with splendor to the eye that follows out the details. The mind is delighted with the objects, and rejoices in their richness and beauty, as compared with all the displays of even thirty years ago. The generation that then were actively engaged, have accomplished wonders.

The grand distinction of *Flowering* and *Flowerless* plants must stand, and the former be divided in *exogenous* and *endogenous*. The Exogens are divided by Dr. Gray into two great subdivisions: 1. *Angiosperms*, or plants bearing their seeds in a pericarp or covering; and 2. *Gymnosperms*, whose seeds are truly naked. This is a great improvement on the previous classifications of authors. The Endogens are divided only into *orders*, and the distinction of *aglumaceous* and *glumaceous* is not regarded.

The *Flowerless* plants are classed in three divisions: 1. *Acrogens*, embracing ferms, clubmosses and rushes; 2. *Anophytes*, as the mosses; and 3. *Thallophytes*, the lichens, algæ and fungi. The former class of *Rhizantheæ* seems to have disappeared, and its wonderful *parasitic* forms fall into some other division. Thus, all plants fall into five classes, presented in a beautiful *Synoptical View* on p. 322.

The *artificial* subdivision of the Exogens into *Polypetalous*, *Monopetalous* and *Apetalous* (p. 323), is still followed, because no structural or organic element has been discovered, which marks the subdivisions which seem so important to render the study of these plants more easy and intelligible. Hence it is that the system is not made *natural* throughout; but very great progress has been made since the days of Linnæus. The study of the Natural Orders becomes the great object, as the natural affinities and relations of plants are designed to be here exhibited. If one is entirely ignorant of botany, it is not so easy perhaps to begin it on the natural system alone. 1. Because there is no one order which stands at the head of the whole, and from which there is a closely dependent chain of orders. 2. Because one is supposed not to know the affinities of vegetables, and in what part of the arrangement particular genera may be placed. 3. Because the characters of plants are not perfectly definite, and they require too careful study to be very easy and alluring to the beginner. As the adoption of the artificial method by Linnæus was a matter of necessity in the study of plants at that period, so the same necessity renders some knowledge and application of it important still, till the principles of the natural system shall be more disseminated. This is happily effected in Wood's Botany, a notice of which was contained in the last number of this Journal. But the time may come ere long, when the study of plants shall be pursued only on the natural system. The Botanical Text Book is fitted to hasten this time. After all the achievements of the artificial system, no one would more heartily rejoice than Linnæus himself, if he were to behold it, at the establishment of the science of botany on principles purely natural in all its parts.

The Botanical Text Book should be in the hands of all our intelligent agriculturalists. The structure, physiology, affinities and economical uses of plants, must interest and gratify the intellect and taste. The study of plants so far will no longer appear as a mere use of terms expressing the names of things, and having little relation to practical results beyond the names of plants. Botany now becomes an exhibition of nature in one kingdom of her most delightful productions. If the names of genera and species are desired, Wood's Botany happily enables one to carry out the principles of the Botanical Text Book to this desirable result. So rapidly as knowledge shall be diffused among the lovers of botany, will the study of the natural system displace all others. Least of all will there be a reliance on the artificial method. Y. C.

A UNIVERSAL PRONOUNCING GAZETTEER : Containing topographical, statistical, and other information, of all the more important places in the known world, from the most recent and authentic sources; with a map. By THOMAS BALDWIN, assisted by several other gentlemen. Philadelphia, Lindsay & Blackiston. 1845. pp. 550.

THIS Gazetteer is intended to fix a standard for the pronunciation of *names;* giving, at the same time, the geographical position of the places, with brief remarks on the commerce, population, and other interesting particulars.

The want of such a work has long been felt by the teachers of geography. To the different nations of Europe, and their descendants, the same letters often indicate different sounds. How then can a plain English scholar know how to pronounce them? Every reader of this class, who officiates even in the family circle, ought to have this volume before him : it should be in every school, and in every library.

The Introduction, which has been prepared with great care and labor, gives the rules for such pronunciation, so that the student may acquire the *theory*, while the body of the work illustrates it by *practice*. In many instances, the etymology of the name is given.

After the preceding remarks, it may scarcely appear necessary to say that this book is original, both in plan and execution. Prefixed to the Introduction, is a list of gentlemen who consented to lend their names as *authorities*, and amongst them may be found many of great eminence. GEORGE R. GLIDDON, our late consul in Egypt; HORATIO HALE, philologist to the late Exploring Expedition; Dr. RUSCHENBERGER, of the United States Navy; and WILLIAM B. HODGSON, the celebrated Turkish scholar, may be cited as instances; and to show that we do not overrate the volume, we subjoin the certificate of a man well qualified to form a correct opinion of its merits. S. S. RANDALL, superintendent of common schools, has also warmly recommended its introduction into all our seminaries. We are also advised that one of the most distinguished professors of the University of Pennsylvania was so fully convinced of its importance, and felt such interest in its success, that he gratuitously inspected every proofsheet.

CENTRAL HIGH SCHOOL,
Philadelphia, July 15, 1845.

I have examined, with some degree of care, the "*Universal Pronouncing Gazetteer*," by THOMAS BALDWIN and others, and am satisfied that it is a work of uncommon excellence and value. It is a book that has been very much needed, both in families and in schools. Its general introduction would greatly facilitate the study of geography, by preventing the present confusion in regard to the pronunciation of foreign names. It ought to be in the hands of every teacher, and of all pupils who can afford it. The principles of pronunciation adopted by the compilers seem to be judicious, and, so far as I have seen, are carefully applied to the details of the book. The work, in other respects, is also worthy of high commendation. It contains, in a small compass, a large amount of important geographical and statistical information, accurate in its character, judiciously selected, and well arranged.

JOHN S. HART,
Principal of Philadelphia High School.

We are not disposed to withhold an expression of approbation of this work at this time. Scarcely a work has been issued from the press, so valuable and useful as this. The want of it had been felt for a long time; and now that it has appeared, it is extremely gratifying to find it better and more important than was anticipated. We believe that there is but one opinion of its value, and that is extremely flattering to the author of the work, of whom we should be glad to speak if we were permitted.

Editors Q. J. A. & S.

FARMERS' MISCELLANY.

HUSBANDRY OF CENTRAL NEW-YORK.

IN A SERIES OF LETTERS TO JOHN KOON, ESQ., OF ALBANY.

LETTER I.

UTICA, September 12, 1845.

MY DEAR FRIEND — As you was so kind as to express an interest in the matters communicated in my former letters, I am induced to resume my pen, and I have hopes that I may still maintain a favorable position in your estimation. Should I succeed, I shall feel some pride in my success; inasmuch as I know that you are a judge of merit, and will neither suffer yourself to be deceived by appearances merely, nor bestow your approbation upon an unworthy object.

On recurring to my former letters, it will be seen that I took rather a wide range in the selection of subjects; and as you have not intimated to me that this was an objectionable feature in them, I shall not now confine my observations to what might be considered a narrow compass. The structure of our hills and vallies, considered with reference to agriculture; the different kinds of crops, soils and their adaptations; cows, hogs and sheep, with many other similar subjects, are interesting matters for the consideration of farmers. The latter, in particular, interest me at the present time; and as people are very apt to think that whatever interests themselves must also interest others, so I find that I am thinking that sheep too must be uppermost in your mind. I do not expect, however, that you will fall in with all of my views; for you know that I am sometimes charged with heterodoxy, and especially do I know that you will be startled when I attempt to show that Saxon sheep do not wear fleeces of a finer kind than the merinoes. You will, without doubt, once more rub up the nap on your imperial saxony coat, I mean your sunday dress, to see if this can be so; and I expect you will be rather slow to believe that you have expended a shilling or two more per yard, in consequence of falling in with common opinions without sufficient examination. I must not, however, be understood as condemning the fine imperial saxony, for the reason that I am myself too poor to wear one. In truth I have not as yet been able to get above the black bombazet for a sunday coat in summer, and the three-quarter homemade woolen of a london-brown for winter. My native sheep's gray is, however, my favorite cloth, in which I am at home, and do not feel that disposition to stick out my arm at an angle of forty-five degrees when walking; nor do I fear that I shall split open the back, when I stoop to tie my shoestrings.

In my perambulations, I have been not a little surprised to see what a great uniformity there is in some sections of the country, both in the general features presented, and in the properties of the soil. Should you accompany me across the hills from Hudson river to Hoosic mountain, you would see that here is a belt which forms truly but one agricultural district, whose predominant character, when products are spoken of, is to produce the grasses and cereals in great perfection. This will be found to be true, whether you cross just above the Highlands, at Albany sixty or seventy miles north, or at Whitehall. You every where find the north and south hills with their gentle slopes, though they are really steepest upon their north-western sides. This is owing to the underlying rock; and no matter what the rock is—whether a slate, a limestone, or a quartz rock—its inclination is uniform, and the soft materials have nothing to do with the arrangement, further than that they are spread over the rocks whose inclined surfaces were previously determined.

There is a remarkable fact in regard to the highest grounds of this belt of country, and it is one which I have had more than twenty years experience in testing the truth of: it is that they never suffer extremely from drought. At the present time, when the corn-leaves at Albany and Newburgh are closely rolled up, in Berkshire they are green and bright, and the hills and furrows are bringing forth abundance of fruit. Showers occur here when they are denied every where else, and the consequence is that this region presents its green surface when the valley of the Hudson is parched with drought.

I may be a little more particular in my remarks upon this region, since I have incidentally brought up the subject. I have stated that the hills run nearly north and south, and generally preserve moderate slopes, though it is not uncommon to find them difficult to plough on their northwestern slopes. The more elevated of these hills are in the neighborhood of Williamstown and Adams, where the highest rises 3400 feet above tide, and the main valley of the Hoosic about 700. Corn does not come to maturity here when planted a thousand feet above the level of the valley, or fourteen or fifteen hundred feet above tide at Albany. The predominating rock in this belt, which is full forty miles wide, is slate. The first twenty miles east of the Hudson is principally slate; then a comparatively thin deposit of sparry limestone; then many a mountain of silvery gray slate, called the Taconic range; then the Stockbridge limestone at the eastern base, and in the northern and southern vallies; and finally a hard quartz rock, resting against the gneiss of Hoosic mountain. This whole belt is entirely covered over with drift, consisting of coarse earth, with pebbles and cobblestones sometimes curiously piled up, as at the base of the Hoosic mountain. We find, however, the loose materials often apparently ploughed out, or rounded excavations formed, in which peaty bogs are not unfrequent.

The Hudson river seems to divide regions which are somewhat dissimilar, or which, though lying in close proximity, yet differ in the age of their respective formations. The remains of the mammoth have not yet been found east of the feeble barrier of this river; and it would seem, if a wider expanse of water had not existed in the era of the mastodons, that they too would have lived eastward of the Hudson, and their remains ere this have been discovered there.

I subscribe myself yours.

LETTER II.

NEW-YORK STATE AGRICULTURAL FAIR,

Held at Utica, on the 15 - 16 - 17 *September*, 1845.

MY DEAR FRIEND — I promised, at my last interview with you, to give you an account of the State Fair. Had I known, however, at the time, the difficulties I should meet with in fulfilling this promise, I should by no means have made it to you: but as it is, I will say a few words, trusting that your good nature will excuse me from attempting a task so great and perplexing, as a full report of the proceedings of this great body, with all their traps, from a threshing machine down to a corkscrew. The first thing in regard to this great affair, and which made the strongest impression upon my mind, was great multitude of folks which congregated at this place upon this occasion. Of course it is impossible for me to tell how many were present, but you can perhaps get some faint idea of their numbers, when I state that the fair was held in a ten-acre lot, and that by nine o'clock A. M. the people began to pour into it through a twelve-foot gateway, until it was filled to overflowing. By eleven o'clock, an equal flood of humanity began to pour out at another place; and so they continued in a ceaseless flood until about five o'clock P. M., when the field appeared to be considerably thinned out, and by six o'clock was emptied of all but a few cattle and their keepers. The number and show of cattle was great. Of fourfooted beasts, there were nearly 700; which may be classed into horn cattle 274, horses 114, sheep 257, swine 34. These were arranged in circles on the outside of the field, with a carriage space between it and the fence, in which gentlemen and ladies were favored with an opportunity of seeing without damage to their persons. Several temporary buildings were erected near the entrance gate, for the accommodation of household apparatus, mechanical inventions, products of the farm, fancy articles, flowers (of which there were many of great beauty and value), etc. etc. These buildings were tastefully decorated, especially the temple erected to Ceres, which was designed by Mr. J. R. WALKER, one of the Floral Committee. A fine hall, for the display of fruits and flowers, was designed by our mutual friend, Dr. THOMPSON, of Aurora. The ladies also were provided with a hall, which was appropriated for the exhibition of domestic fabrics. Indeed I cannot speak of all the designs for the display of the beauties of nature, of art, and of utility. Both Pomona and Flora were remembered, and had their dedicated temples; but far above all the representatives of classic fable, were the living ones, the wives and daughters of the farmers. I write for them.

The trial of plows, on Tuesday, I did not attend. The show of horses was very good. The Durham cattle I could not see, but the sleek ayrshires I was much pleased with, and Mr. Sotham's herefords were excellent. There were many good sheep on the ground.

The poultry show was quite extensive and beautiful; who it all belonged to, I cannot now say.

I was pleased that so many strangers were present from distant parts of the Union. Among them were several gentlemen from the South. The assemblage of men from different parts of the State, and of the Union, I consider as the great thing. It is necessary that some show should be got up, in order to get men together; and is it not strange that some men will go farther to see a Durham bull, than to see a clever likely man, a being endowed with reason and intelligence? So it is: but anything to induce our farmers to assemble together; to form an acquaintance, and make themselves known to their fellow-men.

In my next, I propose to give you some account of Onondaga county, and of the farm management of a few of our friends there.

I subscribe myself yours.

LETTER III.

CAMILLUS, September 20, 1845.

MY DEAR FRIEND — I proposed, in my last letter, to give some account of my travels and acquaintances in Onondaga county; and now having set myself down to fulfil this promise, I feel at some loss what to say, and what subjects will interest you most. But it appears to me that the first thing which is inquired after, on going into a county, is, what is its soil and productions? So I shall, in the first place, take up these subjects for consideration. Now Onondaga county is in the heart of the State, and I have sometimes heard her called the empire county, but on this point I have not made up my mind. I do know, however, that there are many productive and profitable farms there; and the county is especially favored with some geological formations and deposits, which the eastern, northern and southern counties are destitute of, and which certainly confer many and great advantages. The limestone ranges formed of the Onondaga and Manlius waterlimes, are of great importance: they are in contact here, and form a distinct belt through the county from east to west. This belt borders the Erie canal, and rises in many places directly from it in the form of a terrace or table. But the most important formation is the limestone shale, below these water-limestones, and which also form a lower and parallel belt. These shales are remarkable for having at one time contained crystals of salt; and even now, in consequence of the rapid decomposition, they form various saline bodies, and it is interesting to see how the springs are charged with saline matter according to the level from which they issue. Thus the lowest layers, including the hopper-formed cavities and the gypsum beds, furnish springs highly charged with saline matter, sulphate of soda, magnesia and lime. Above, and in the next tier of strata, they are highly charged with carbonate of lime, and from these immense deposits of tufa are formed. Even the springs are petrifying, and wood immersed in them becomes stone, or stony matter takes the place of the wood. The higher shales, though they do not furnish soft water, yet it answers well for drinking and cooking. I omitted to mention the fact, that the lower layers of this limestone shale furnish, in a few instances, a water which chars vegetable matter; and I find, on examination, that it is a weak sulphuric acid.

The limestone shale is the rock, or formation, which is specially adapted to the production of wheat and corn. It has been stated by most writers, and repeated by most farmers, that it is the limestone above which gives character to the soil of this and some other counties, and especially renders them wheat-growing; but this is not true. Even the late esteemed Mr. GAYLORD seemed to have selected a farm because it was based on limestone; but it is the shaly mass below, which imparts so much excellence to the whole belt of country, and this runs through the middle of Onondaga, or a little to the north of the middle. A black shale succeeds the Onondaga limestone in the ascending order; and this gradually passes into gray or greenish siliceous shales and sandstones, still higher up. Very little limestone is found south of the first belt of limestone which I have mentioned above.

We have, then, in Onondaga county, two shaly formations, with a thick mass of nearly pure limestone between; and they form terraces which rise one above the other, commencing on the level with Oneida lake, and ascending step by step up to the hills of Pompey. These several terraces differ much in their agricultural relations. The new uncleared land on the lowest terrace, just above the Cicero swamp, is worth 10 – 12 dollars per acre; the next terrace, if dry and rolling, is worth 50 – 60 dollars per acre; and the high land of the black or Marcellus shales, is worth from 35 – 40 dollars per acre. Many value their lands much higher ; but the prices at which they are now estimated, are those which they would sell for at a forced sale. I am sensible I have not given you a very scientific account of the geology of this county ; but to supply those parts in which I am deficient, I will refer you to the geological map, which is very generally distributed, and is the most accurate one that has been published in this country.

I assure you that I remain yours most sincerely.

LETTER IV.

CAMILLUS, September 23, 1845.

MY DEAR FRIEND— What I have said of the geology of Onondaga county, was designed as preparatory to some statements in regard to its productions, an account of which I now propose to give you. On referring to my former letter, you will perceive that I gave preference to a belt of country running through the county on the canal, or that terrace which is entirely above the low marshy grounds forming the swamps of Cicero. It passes, for example, through Camillus, and a very good sample of it may be seen at Mr. GEDDES's farm. It is from one and a half to three miles wide, and is based directly upon the green gypseous shales, or upon the Onondaga salt group. It would be exceedingly interesting to know in what respects, if any, the wheat grown upon these shales differs from that upon the black shales : it would be difficult, probably, to make a comparison between the products of these shales and the limestones immediately above, inasmuch as the soil of the shales has been transported south so as to intermix with that of the pure limestone ; but the higher portion, at least of the black shales, is nearly all derived from their own decomposition. There is a recognized difference, I believe, aside from any change which can be effected by climate. To show the excellence of some of this land, I will state what was told me by a person who may be relied upon. A certain field has been under cultivation for the last thirty years, and has produced a crop of wheat every alternate year, without a particle of manure, and its yield has averaged twenty bushels to the acre.

It is the soil of the gypseous shales, and not of the limestone, which has been supposed to form the basis of the wheat soil of the western counties. The opinion of farmers on this point, is founded upon the distribution of the calcareous gravel. As far south, for instance, as they find the limestone pebbles, they calculate upon getting good crops of wheat, especially in the vallies ; but when the limestone disappears, they do not expect to get but two or three crops of wheat. Now the reliance upon the limestone pebbles is very well as an indication for wheat land ; nevertheless it is not the presence of limestone that makes these lands thus productive in wheat, but the product of the shales below, which has been carried as far south as these very limestone pebbles of which we are speaking. The gypseous rocks continue from year to year to disintegrate and decompose, and hence are continually furnishing fit matter for the growth of wheat. But again, this soil is also very productive and superior for indian corn, which grows large, and forms sound grains, from the great abundance of magnesia which, I have no doubt, the soil contains.

The soil of Onondaga does not pack : it contains, in some places, many cobblestones from the Medina sandstone, interspersed with short broken fragments of the shale which are frequently brought up by the plow ; and thus the nature of the material is such that it does not form a decidedly stiff clay, but merely an argillaceous soil. In the lower vallies, a stream flows, which is more or less charged with tufa and marl, and this is frequently overlaid with peat. But the quantity of vegetable matter in the soil, in all the farms which have been worked several years, is extremely small.

There is a conclusion which I will state here, as it was derived from Mr. GEDDES : it is this, that soil, which is ploughed and sowed for many years, finally becomes so compact below as to require draining. Mr. GEDDES founds his opinion upon the fact, that if you have a space of 5000 feet which you wish to fill with earth, it will require 6000 feet of soil to fill it ; or the same thing is seen in filling post-holes, which receive not only all the earth thrown out, but also the post itself. Stirring the soil, then, makes it lie in less space, or more compactly ; and if there is a tendency originally to the accumulation of water, it will require drainage after a time, in order to be productive.

I shall proceed with this subject in my next.

Yours, &c.

LETTER V.

CAMILLUS, September 25, 1845.

MY DEAR SIR—I closed my last letter, in speaking of the effect of cultivation in increasing the compactness of soil; and undoubtedly the conclusion there expressed is true, aside from the main fact upon which Mr. GEDDES founds his opinion. The same result had been witnessed by myself; but I had attributed it to the loss, first, of vegetable matter, which is always removed from a new soil in the course of a few years cultivation, unless indeed it is abundant as in that of the Western States; and, secondly, to the infiltration below of the calcareous salts. Both these causes operate to bring about the result we are speaking of; and when they are combined with the one above indicated by Mr. GEDDES, a very decided change must inevitably be produced in the texture of the soil.

On a little reflection, it occurs to me that this one fact will explain, or at least will go far to explain, some others. We know, for instance, that in the early settlement of many parts of New-York and New England, several kinds of fruit were cultivated with success. Peaches, for example, grew well in Berkshire in Massachusetts; and I am informed, also, that even in Pompey and Niles and the towns in that range in this State, and farther south upon the Hamilton and Chemung shales, they grew in great perfection. Now, however, they are not and can not be raised, or at least not with the success that attended their first cultivation. This fact may stand connected with the very change above alluded to in the condition of the soil. It is in that state which is usually termed *cold:* it is so compact, that the water, though it by no means stands upon the surface, yet does not pass off with sufficient rapidity, but is retained so long, and so near the surface, that its evaporation keeps the temperature slightly below what it formerly was. If this theory is correct, a general deep draining will remedy the difficulty, and bring the soil back to the porous and warm condition it originally possessed.

This subject is one of great interest, and worthy of careful investigation. Against the opinion I have expressed in regard to the cause of those changes which now prevent the cultivation of the peach, it may be urged that the temperature is reduced by the clearing of the country; or rather that the destruction of the forests has opened it to the inroads of bleak and cold winds, or removed those trees which gave shelter to the more tender productions we are speaking of. All these are undoubtedly to be considered; yet it seems to me that the first named is by far the most important. I should like to hear your opinion upon it. The fact is clearly established, and is known over a wide extent of country; and if we can but get at the cause, it is possible we may also find a remedy.

I intended here to have spoken of Mr. GEDDES's farming operations, but I see that I had better delay it until my next, and so you will not object to my closing this with,

Yours, &c.

LETTER VI.

TYLER POST-OFFICE, September 27, 1845.

MY DEAR FRIEND — I write you from the residence of my friend Mr. GEDDES, who is a distinguished agriculturist; and in looking about his place, I am well satisfied that plans of houses, of yards and barns, are of but little use, or perhaps I had better say they are only generally useful. Now the location, the exposure, the position of the farm-houses, barns, etc. must all be governed by circumstances; and each farm has something *sui generis*, which must control the arrangements for its cultivation. Even the inside plan of the house may be essentially modified by the relations of the spot on which it stands. Leaving, however, this subject for conversation when we meet, I propose to speak in this letter of Mr. GEDDES's farm management.

The farm contains 300 acres: it lies on both sides of the great western turnpike leading from Syracuse to Auburn. The railway skirts it on the north, and it is about one mile south of the canal. Mr. G.'s management is this: He rents the greater part of the farm to two tenants, who cultivate different parts as they may agree; but over the whole Mr. G. retains the entire power of directing, not only what crops are to be raised, but how the land shall be cultivated. By this system, unity is preserved in the management, the land prevented from too close cultivation, and a system persevered in which keeps it in excellent condition. To the tenants a house is furnished, together with stables, garden, pasturing of cows, hogs and teams, and one half of the seed-grain and grass-seed, and a threshing machine. The tenants do all the work, and deliver one half to the landlord or in market.

Arrangements about the farm-house. It is impossible to give you a very correct idea of these arrangements, without a plan; but I may state that the house is situated upon and near the brow of the table land of the country, with a creek upon the south fifty-five feet below the level of the basement story of the dwelling. This makes a slope from the house to the creek, which is an unfailing stream. This position of things determines many of the arrangements about the premises. Along the brow of the slope to the creek, the barns and sheds for cattle, sheep and hogs, are placed. The position secures, in the first place, perfect drainage, which is indispensable to comfort and health; and yet it gives an opportunity to retain the water for rotting manure, where it is the most convenient; and the creek supplies an unfailing source of water for cattle and other purposes, both summer and winter.

As water is one of the most indispensable of all articles in husbandry, Mr. Geddes has availed himself of his position to supply himself in part from the creek. This is effected by means of the power of the waterfall, which sets and keeps in motion a water-wheel, which moves a double acting forcing pump, which drives the water through pipes to his house, for washing, bathing, etc; to the barn, for cattle, hogs, sheep and poultry, each kind being separate and in their proper places; and the waste water goes to the manure heap, for assisting in the decomposition of straw and refuse matter, which is received in an impervious basin upon the brow of the ravine. Besides this, there is a sufficiency of water for the two tenants, for which they pay him, and which really amounts to enough to cover the whole expense of the watering establishment. The water-wheel is a most excellent one, being ten feet in diameter, moving with a slow steady motion, every revolution of which forces to the top of the hill a gallon of water, which amounts to rather more than six gallons per minute night and day. A good well of water, near the stoop leading to the kitchen, supplies water for domestic purposes.

Mr. Geddes, in his buildings, acts upon a very sound and useful principle, one which combines economy and profit with convenience (if the distinction is proper), namely, that each department of husbandry shall have its house, where all that appertains to it shall be conveniently placed and arranged. I say *arranged*, because that is the true word, meaning that things are not only put in, but classified; so that if you please, you may go in the dark and put your hand upon any article that may be wanted. Thus there is the carriage house, with each harness upon its own peg; there is the tool-house, with each tool in the chest or upon its hook; the poultry being entirely excluded from these premises, which is not always the case in other establishments: the grain-barn, the hay-barn, the sheep, the cows, the hogs, etc. each occupying their own places. The poultry have suitable conveniences for laying and hatching. The milk-room, in particular, is worthy of especial notice: it is a beautiful little building, situated in a triangular place in the yard, leaving space for driving a team with wood or any other load to the door of the wood-house, and but a few feet from the entrance door of the kitchen. It is constructed of cobblestone laid up in mortar, is thirteen feet square, and the corners are of hewn stone: it is one story high on the side facing the kitchen, has a stone floor, with one room for milk, lighted with two windows, which can of course be darkened by blinds, so as to exclude the flies, and yet allow the room to be aired. Upon the south side, the descent gives room for an ash-house, with its door enclosed in stone. Immediately above the ash-room, which has an arched roof, is the smoke-house; the smoke being admitted from the ashery below, through openings in the arched roof. The hams, and other meat designed for smoking, are suspended on hooks on cross-pieces, which are then put in for smoking. The whole arrangement, as you may readily conceive, is such as to ensure perfect safety from fire, and to combine every convenience in each operation. The meat is suffered to remain in its place through the season, as the room is cool, excludes flies, etc. Some other conveniences are connected with this little but neat building, the whole cost of which was only one hundred and fifty dollars.

Mr. Geddes has under culture, different crops, as follows: 80 acres of wheat, yielding upon an average 20 bushels to the acre = 1600 bushels; 40 do. oats, averaging 60 bushels to the acre = 2400; 19 do. barley, averaging 37 bushels to the acre = 703; 16 do. corn, averaging 50 bushels per acre = 800; with a crop of potatoes, amounting to about 800 bushels. Besides the above, I might specify the products of the dairy, the root crop, hay, etc.; but this is sufficient.

In closing this epistle, I may very properly remark, that the farm received the premium from the county society; and in addition to this, Mr. G. took the first premium for the best sheep and best bull, from the same society. It is proper to say, however, that Mr. G. did not enter his farm for the premium; but the committee gave an honorary one, which consists in placing it first on the list of farms.

I have omitted probably many things which would interest you in regard to the husbandry of Mr. G. You will, however, see, I believe, that his system is a profitable one, and that there is nothing that looks like fancy work. I assure you it wants only a few such farmers in the several counties, to make this business the most profitable and honorable in the sight of all — to make labor honorable with the gentry. I mean, by this, the holding of the plow and rake.

Accept of best wishes, and believe me yours, etc.

P. S. You will perhaps wonder that I never speak of the ladies who preside over the kitchens and parlors. I can only say, that on this subject, my gifts are very small. I leave all this to our friend J. S. of the Farmer's Library: he is the man who attends to these matters.

LETTER VII.

TYLER POST-OFFICE, September 29, 1845.

MY DEAR SIR — In one of my former letters, I alluded to the wool of the saxon, and intimated to you that wool-growers and manufacturers had been deceived in its fineness; that it really is as coarse as the merino — certainly no better than the best merinoes; and hence inasmuch as it is short in its staple, and light in its fleece, must be the least profitable to the world, provided it costs as much to rear them. I propose now to take up this subject once more, for the purpose of giving more in full than I have yet done, some of the results of my examination. I shall confine my remarks, however, to those points which relate to the measurement of the fibre; and it is my purpose to give a comparative view of the measurements I have recently made, from fleeces which were exhibited at the late fair.

In the first place, I will premise, that the wool on different parts of the body varies in fineness: this is probably pretty well known.

Thus, the wool of the fore shoulder is invariably the finest; that of about the middle of the trunk, the next; and that of the flank the coarsest: the latter too contains a greater amount of coarser hairs, or there is a greater inequality of the fibres than elsewhere. From my theoretical views of this difference, I am inclined to think that wool of the evenest grade will be found upon wethers, though I have no facts to prove this, for I have not made examinations of their wool as yet.

Again: The diameter of the fibre of wool, referred to the French standard of measures, is equal to the one-hundredth of a millimetre, which is not far from the $\frac{1}{2500}$th part of an inch. This one-hundredth part of a millimetre, and the fibre of wool, are both exposed to the same magnifying power of the microscope; and each division of the scale in fig. 1 represents this part of the inch when seen under the same power as the fibre of wool, so that you may have at a glance the comparative diameters of any two fibres under examination. So much is stated by way of preparation for the remarks which are to follow.

Fig. 1.

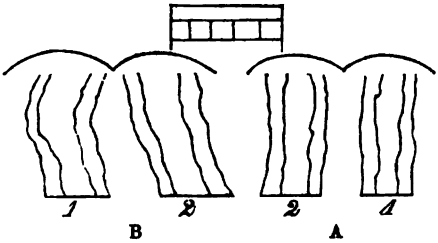

Figure 1, with the scale of measurement as the standard of comparison, exhibits the comparative diameters of the wool fibre of the two premium sheep. A 1, is the fibre of wool from the shoulder of the second premium sheep (Mr. Church's); 2, do. from the flank. B 1, fibre from the shoulder of the first premium sheep (Mr. Crocker's); 2, do. flank.

Fig. 2.

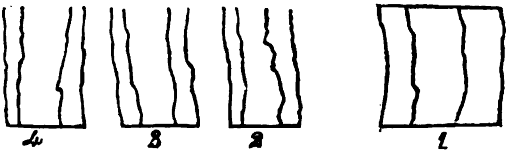

Fig. 2. No. 1, fibre of bakewell, magnified as above: it is about the average fineness of this kind of wool. No. 2, fibre from ewe belonging to Col. Sherwood, 3 years old (Blakesley sheep). No. 3, do. of Mr. Bailey's ewe. No. 4, do. Mr. Atwood's.

Fig. 3.

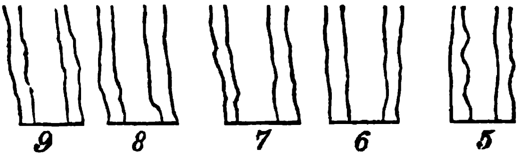

Fig. 3. No. 5, fibre of Mr. Ellis's ewe, fleece weighing 6lb. 13 oz. No. 6, do. Mr. Nettleton's yearling buck. No. 7, do. the imported 5 per cent South American wool, which you see is nearly as fine as the best of our flocks. No. 8, do. Col. Sherwood's 3 year old buck, sheared 8½ lb. wool. No. 9, do. finest Saxon wool in market.

Fig. 4.

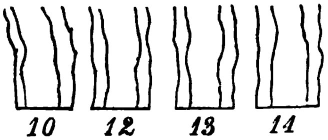

Fig. 4. No. 10, fine Ohio wool. No. 12, do. Saxon of the late Mr. Grove's excellent flock. No. 13, do. original imported Spanish wool, by Seth Adams. No. 14, do. Morrell's saxon.

The above measurements and drawings were made with great care. A great many fibres were measured: some were finer and some coarser than those given, and I selected in every case the average measurements. One measurement, which I think will interest the wool-grower, is that of the imported Spanish low duty wool. From examination, it seems to have been soiled purposely in order to give it the appearance of poor wool. Wool-growers should look to this matter, for undoubtedly an immense amount of fine wool has been smuggled into the country, and it seems impossible that its fineness should escape the notice of custom-house officers. I know not, however, how it is; but I do know that unless each great interest looks out for itself, nobody else will, and certainly the manufacturer is the last one who will look after the interest of the wool-grower.

With these remarks, I close by subscribing, &c.

P. S. Since writing the above, I have been favored with some Saxon wool by the Hon. Senator BEEKMAN, from his flock, which I am much gratified to find is finer than any of the above: the finest specimen is nearly $\frac{1}{1300}$ of an inch in diameter. It is decidedly finer than that which I measured from the celebrated flock of the late Mr. GROVE. I find one thing peculiar to the fine saxon: the hollow part of the fibre is larger than in the coarser wool, which I believe gives it that silky lustre and soft feel. I designed to have given you the comparative strength of the above examples of wool; but I find my time so much taken up with other matters, that it is impossible to enter upon experiments which require so much care and time in order to be of any value. I shall, however, in the next series, give you these results.

LETTER VIII.

SKANEATELES, September 30, 1845.

MY DEAR SIR — I left Mr. GEDDES to-day, and am now on the extreme western border of the county of Onondaga, at Skaneateles. I have just been looking over the farm of my friend FULLER, who makes quite a figure at farming, and is another example of the right sort of farmers. Mr. F.'s farm is about half a mile from Skaneateles, upon the eastern slope of a range of elevated ground on the western shore of the lake. The slope is gentle and uniform. The eastern side is probably based on the upper limestone of the Hydraulic series, but extends up so as to reach on the western side the Marcellus shales probably. The soil, however, is deep, and no rock crops out on the surface. The eastern side was low and wet, and in fact the whole slope has been found to require draining, or at least one half of the whole farm. It is a most interesting case, and presents also a triumph of skill in the draining and reclaiming of lands. A person passing over much of the surface, would hardly suspect that an inclined plane of that slope would require draining at all. There are several points at which springs make their appearance. More, it is plain, must be cut off, and conducted to the lower levels by a drain ; but very large surfaces appear, which require the same management, although the land is neither springy or apparently wet. Now Mr. Fuller says, that in making drains, he disagrees with our friend of Singsing, who favored us with a description of his method in our first number. Mr. Fuller dispenses entirely with flat stones, and uses those round hard-heads, or any other kind which he finds scattered about his field. The ditch itself is made in the usual way, and of sufficient dimensions to answer the purpose intended. Then two rows of round stones are laid, upon which a row of larger round ones completes the top, and the same kind are filled in to the desired height. The flat stones are not decidedly objectionable, but there is usually too much difficulty or expense in procuring them ; whereas the rounded stones of the field answer the purpose, to say the least, as well as any, and, besides, a good hand will lay them very fast, and diminish very considerably the expense of ditching.

I would recommend those farmers who wish to construct cheap drains, to consult Mr. Fuller, who probably has had more experience in these works than any man in the State. He is quite unwilling to admit that his system of draining has cost him more than ten cents per rod. I do not, however, now feel free to speak of all Mr. Fuller's operations in farming, and in draining ; but I would say, that if full barns are a good test of a man's success and skill in this business (and I do not see why they are not), then we need go no farther, for here the barns are full from top to bottom. I hope, in conclusion, that Mr. F. will give a full account of his method of draining, in the next number of the Journal. It is only by means of collecting the methods adopted by different farmers, that the practice of husbandry can be advanced in this country, and it is American farming that we want to know most about. I think you will agree with me in this sentiment ; and I think, too, you will be willing that I dismiss for a time this subject. Yours, &c.

LETTER IX.

ALBANY, October 2, 1845.

MY DEAR FRIEND — You know very well, that in our intercourse with our friends, we sometimes misunderstand them even on subjecs devoid of all intricacy. At any rate, it so happened with me in my visit last summer to my venerable friend DAVID THOMAS. I will therefore devote one letter to the correction of one or two statements which I then made to you; and at the same time take the opportunity to state a few more particulars in regard to the rearing of fruit trees, which I have just obtained from the same high authority.

First, in regard to Dearborn's seedling (see page 84, vol. 2, No. 1), I make my friend to say that it is the very best of pears. It appears, however, that he gives preference to the virgalieur. I ought probably to have said that Dearborn's seedling was one of the best summer pears.

Again (p. 84), in regard to the common locust. This grows well on calcareous soils, if not injured by the *borer:* it is the *Robinia hispida* which declines and perishes.

With these corrections, my friend gives me the following additional facts, which are undoubtedly the result of much experience and extensive observation. No tree appears to be more benefitted by animal manures, than the peach tree. We may often observe this when it grows near a barnyard, so as to reach the manure; that the growth is greater, the leaves greener, and the fruit larger, than when it stands on sterile ground; and even as a general rule, fruit of the same variety is flavored in proportion to its size: the larger, the finer. Urine may be very advantageously applied to this tree, especially while it is small, as well as to young apple trees. It not only hastens their growth, but, by its offensive odor, repels the *borer* from the latter, and the peach-worm (*Ægeria*) from the former. A small tree will bear a pint once a fortnight, and perhaps more and oftener; for I have never injured any of my trees by this application, and consequently have not ascertained the amount which may be used upon them: certainly large trees will bear much more.

Having given you the above important corrections and additions of my friend, I close by observing that the village formerly called *Union-springs*, is now more frequently and more properly called *Springport*, and that *Aurora* is only the name of a village in the town of Ledyard. I remain yours, &c.

LETTER FROM J. H. ESTABROOK, TO ONE OF THE EDITORS.

CAMDEN (Maine), August 26, 1845.

DEAR SIR — I send you a short article for your useful agricultural periodical, should you deem it worthy of a place.

It must be a fact known to all, who are in the habit of observing, that old orchards scarcely have a tree that is not hollow, or, in other words, deprived of its heart growth. Apple trees have many enemies that tend to produce this effect. The *borer* penetrates to the heart and pith, generating disease and death in that part, while the new sap wood continues to grow and flourish. Cutting off a limb too closely to the trunk, will often cause *rot* to penetrate to the heart of the tree. Woodpeckers frequently make holes, which become inhabited by ants and lice, and at length disease and decay are propagated to the heart of the tree. A portion of bark is often accidentally removed, and the wood under it dies. This decay soon reaches the heart, while nature is depositing new layers of sap-wood. After a time, the external wound is healed, but the heart is gone never to return. These are some of the causes that operate to produce the effects visible in old orchards. We will now look at the change that this produces in its fruit-bearing powers. The fruit subsequently produced, will be deteriorated in size, flavor and fairness; it will be incapable of reproducing from seed. Apples from this parentage, after being gathered and housed, decay prematurely. All scions cut from limbs of this description, will carry with them the imperfections of the parent stock.

The question now arises, Is there any remedy? I answer yes: thin your old orchards, leaving nothing but limbs of three or four feet in length; from these will spring out suckers. These suckers rise from the wood like in appearance to a wart; they soon push through the bark, and grow most luxuriantly, so that in a year or two fruit is produced from them. Apples produced from scions of this description, will be equal in every respect to the best productions of the parent stock in its early growth; and why? The sucker thus produced, is in some measure a parasitic plant, finding root in the bark and wood of the old stock, which gives to it its peculiar character of fruit, but no farther. It has the means, within itself, of its own perfect organization, and has freed itself of its parent imperfections, viz. a want of *pith*, without which in the tree, no fruit can be perfect.

It will readily be perceived, that the above theory must have a decided influence on the art of engrafting. Whenever the pith is not brought in perfect apposition, and in contact with pith, the seeds of imperfection are sown, and the fruit will partake of the character of hollow-tree fruit. Whenever scions are taken from twigs, the true offspring of a diseased parent stock, the fruit will be imperfect. In taking scions for engrafting, select either from a young healthy tree, or from suckers such as I have described as parasitic in their character on old diseased stocks; engraft by taking a twig of a young healthy tree or sucker as above described; make an oblique incision with a sharp knife, cutting the twig entirely off, then bring to it the scion to be engrafted of exactly the same size, and cut smooth with the right bevel, so as to apply bark to bark, and pith to pith; and if properly secured with suitable composition, there will scarcely be any stint of growth, and the fruit will appear in due time in all its original perfection. Formerly when I ate engrafted fruit, I supposed, as the seeds were almost uniformly blasted, that crossing stocks would produce the individual, but divest it of the power of procreation, as we notice in some species of the animal kingdom; but further observation has fully convinced me of my error. It is ignorance on the part of the engrafter, of the necessity of preserving the power of the pith as well as the bark, that has led so extensively to a deterioration of engrafted fruit.

MR. PRENTISS'S FREE MARTIN.

In the first number of this Journal, Dr. Monell, of Newburgh, gave an article on Free Martins, in which he advanced the opinion that there are two varieties: the first, which is the most common, is a *hermaphrodite*, but has the masculine look, has no desire for the male, and of course never breeds; the second resembles the cow, or female, externally, and exhibits the usual propensities: it may breed, or it may not. This seems to be a correct generalization, at least as much so as possible in deviations of the nature and character of those which exist in the animals under consideration; for it will probably be found true, that no two individuals will exhibit precisely the same structure, configuration and arrangement of parts.

Irregularities of this kind will not be governed by a law; and we believe that at least minor deviations will be found on dissection, that were not suspected from the appearance of the animal while living. For a general account of free martins, we refer to page 65 of the first volume; and proceed here to describe Mr. Prentiss's animal, which was slaughtered September 2d, and which we were permitted to examine in company with Mr. Howard of the Cultivator.

Fig. 1.

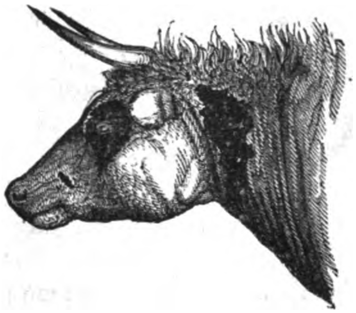

Figure 1, is a portrait of the head of the animal: it will be noticed that it resembles a steer of the same age.

Dissection. The parts disclosed on dissection, were about one fourth the ordinary size of those in the well-formed female. The ovaries were white and fatty : an incision exhibited imperfectly their glandular structure. Two small round bodies, similar to graafian vesicles, were seen in the body of the right ovary. We do not say that these were perfect graafian vesicles, but only that there were two round reddish bodies of the size of a small pea, and readily distinguishable from the enveloping tissue. In one side of the animal, the ovary was kidney-shaped, and an inch and a half in length; in the other side, there were two ovary-like bodies of about the same size and form. The fallopian tubes were obscure, and appeared more like ligamentous bodies than usual. The uterus did not appear to be one continuous body. At the point which answers to the fundus, or at the insertion of the horns of the uterus, were two oval or rather cylindrical bodies an inch and a half in length, which came in contact at the bifurcation : these were partially interrupted as they passed down to form the body of the uterus, but assumed their size and cylindrical shape again after about an inch, and passed down parallel with each other, thus forming the body of the organ. A septum passed across their termination, and formed what appeared to be two orifices into the uterus; but this septum finally terminated in the upper part of the vagina, and in fact only a minute orifice existed at what is termed the os uteri, an orifice which scarcely

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Fig. 2.

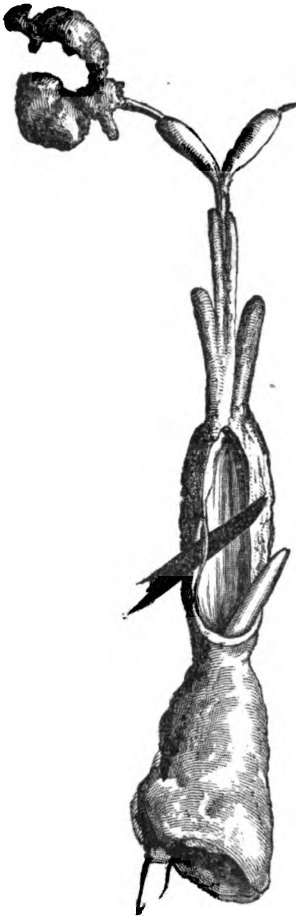

Fig. 3.

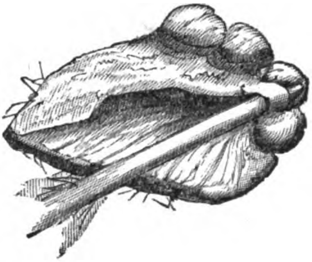

Fig. 2, represents the connections of the organs; the ovaries, fallopian tubes, vagina, much smaller than usual.

Fig. 3, represents the glandular bodies, with ducts opening into the vagina.

admitted a crowquill. An inch and a half below the os uteri, a thin fibrous membrane extended across the vagina, forming a complete *cul de sac;* the superior cavity diminishing from a diameter just admitting the finger, until it terminated in a point at the os uteri; while the lower division of the canal admitted the introduction of two fingers with ease, as far as the membranous partition. Near the termination of the vagina externally, there was a large mass of fatty cellular membrane, in which were enveloped four oval bodies of a glandular structure, which might possibly be called testicles: these were each supplied with a short straight tube, about three fourths of an inch in length and one fourth of an inch in diameter, which opened directly into the vagina. No such bodies are found in the cow in the normal state, and here we consider them analogous to testicles in the male, but undeveloped: this opinion rests on their glandular structure. From this dissection, the relation of the animal to its sex will be understood without comment.

The animal was three years old. It exhibited a remarkable disposition to fatten, as will be seen by its weight as stated below; especially when it is considered that it was kept during the past dry summer in ordinary pasture only, and unsupplied with any other food than the parched fields afforded.

Weight of the whole animal	824 lbs.
.. .. hide	68
.. .. fat	70
.. .. beef	686
Total	824 lbs.

MR. HOPKINS'S OPINION ON THE TRANSFORMATION OF WHEAT INTO CHESS.

We are obliged, in this case, to state from memory the substance of a communication in regard to the transformation of wheat; inasmuch as, during our absence, the letter containing the opinion of our highly respected friend was mislaid.

The case upon which Mr. Hopkins in part founds his opinion, may be stated as follows: The land was new; the bearing excellent, and the condition of the whole field was all that a good farmer could wish. The wheat was well cleaned, came up well, and promised something more than an ordinary crop. The snow disappeared in March, or early in the spring, leaving a thick mat of wheat. In April, however, or soon after, a heavy snow fell, covering the whole field evenly, which remained two or three weeks. Now comes the result : This field, which had been so promising up to the time of the snow, entirely reversed its promise. There appeared, over most of the surface, a mouldiness of an uncommon character, as if the ground had been heated by a thick covering of manure; and the whole produce of the field, which had been sown with well cleaned wheat, without wild seed of any kind, was chess, a heavy crop of chess, instead of wheat.

This is undoubtedly a strong case, and is certainly extremely perplexing; nevertheless there are many analogous cases on record, and in the observation of many. For instance, when a field has been burned over, especially among the New-England hills, a crop of fire-weed surely follows, if it is not otherwise occupied. So the common red cherry, as we have often witnessed, succeeds other growths of timber that have been destroyed.

We believe we have stated the case fairly, and we are probably driven to the adoption of one of two doctrines, either that wheat does change into chess, or else the seeds of chess are pretty abundant in the soil previous to its cultivation.

ON MANURES.

Of all substances used as manures, those consisting of the different parts of animals have always been considered as the most efficient as fertilizers. Whether we regard the quantity of nitrogen as the criterion, or the inorganic parts, will make little difference here. The truth is that both have their influence, and the presence of the former, producing a tendency to rapid decay, the effect of these substances is upon the present crop. Yet such parts as the hair, nails, feathers, wool, bones, etc., on account of their solidity of structure and the little water they contain, being slow to undergo decomposition, are among the richest and most permanent of manures. We know comparatively little of the value of some of these, practically; but the Chinese are said to preserve with the greatest care, even the parings of the nails, and the clippings of the beard, to be used as fertilizers of the soil.

Very little use is made in this country of the bodies of animals for this purpose. If one dies, its carcase is buried, or thrown out to the dogs or crows; and thus is wasted a quantity of most valuable matter, which, if made into a compost with swamp muck or peat, would serve to convert several tons into a most excellent manure; and this at very little trouble, and no expense that would not be repaid many fold to the farmer in his crop. How much better would it be to save such substances where they may be applied to benefit a particular portion of land, than to let them go to scatter a divided influence on the world?

Precisely similar is the case with the blood and offals of animals butchered for our markets. Thousands are killed every year, and yet we venture to say that by far the greater part is carelessly thrown away, where it will be of no use; or is carried away by the streams, to be diffused over all the world. There is by far too much generosity in this, and a little more economy might be practised with profit. There is an abundance of peat in every vicinity, and how easily might this blood and offals be used to convert it into a most active manure? How much of this is wasted in our large cities, where thousands of animals perish annually? Enough certainly to supply the grain that is devoured by a very large portion of the inhabitants.

We have lately seen a statement, that thirty thousand head of cattle are yearly slaughtered in the city of Troy, the greater part of whose blood and offals is thrown into the Hudson river.

And here we would ask the question of every householder who has a little garden or only a spot of ground where he raises, or perhaps we should rather say starves, a few stinted, scrawny vegetables, or perhaps nothing but a little patch of skeleton flowers, whose ancestors were the pride of their soil, but whose children, under the neglect of ignorance, are fast going to nothing; how much really valuable manure he sees wasted every year from his own house? Count the woolen rags; the sweepings of your carpets — a capital manure; the bones; better yet, the soapsuds, the waste of the kitchen, everything that has ever helped to constitute a plant or an animal, that is now thrown out to be a nuisance in our streets; and how much do you find? Why enough to make your scanty bit of ground a productive farm, compared with the desert it is now. It wants but a little economy and prudence to save all these, and making them into a compost even with a portion of the soil itself in some small corner, to make your gardens what they ought to be; and where now you grow vegetables which you can hardly find when you want them, you might raise as good as any one.

Bones are a very powerful fertilizer; but like the other parts of animals, are apt to be entirely wasted, in this country. The English can send over to this country, and pay a high price for them, and, after all the expense, make them profitable; but our farmers have not opened their eyes yet to their own interest, or they would not suffer this to be done. All that is necessary to prepare them for use, is to grind them or break them into small pieces, when they may be applied directly to the crop, or mixed with the compost heap till decomposition has commenced. They are sometimes applied whole about the roots of trees and vines, and with marked effect.

Recent bones contain a considerable quantity of animal matter, which is slowly taken from them by the action of the air and water. The benefit derived from these, must be ascribed to this as well as the earthy salts which constitute by far the greater part of them. But when bones are burned, the organic part is entirely consumed; and when applied in this way, the phosphate of lime contained, is probably the most efficient substance.

But in the liquid excrements of animals, we have a manure of no little value; indeed, far more valuable than the solid. In the former are found all the soluble salts which the animal system contains, together with the greater part of the substances producing nitrogen. The urine consists of the wastes of the body: this is continually, every instant, undergoing change. Portions of matter which help to form our bodies to-day, will be gone to-morrow; and in the course of a few years, the whole is renovated. Everything, except what is carried off by the lungs and skin, passes off with the urine.

The solid excrements consist only of those parts of the food which are not appropriated to, or fit for the nourishment of, the body, with a small quantity of the peculiar secretion of the intestines. Now, from these remarks, it will be seen that in the liquid and solid excrements, we have the means of replacing all that is taken from our fields in the form of crops. What is fed to the animal in the adult state, is immediately returned, if not in substance, at least in quantity; for the full-grown animal, suffering no increase of body, requires only so much food as will compensate for the waste constantly taking place. In the young and growing animal, a little more is necessary, to assist in the construction of bones, muscles, etc.; whilst from the old animal, which is continually becoming smaller, more is given off than is consumed. Thus the action of crops in exhausting the land will readily appear, as also the use of the application of manures. What is taken off and fed to cattle or consumed by man, is so much of the inorganic matter of the soil taken away, which, if necessary to the production of one perfect crop, is as necessary for another; and as the soil is deprived of these year by year, its capabilities will be diminished, till it becomes incapable of producing the same crop. In animal manures we restore all this, and thus are enabled, for any length of time, not only to keep up, but to increase its productiveness.

But, on no farm, can the amount of animal manure produced, be equal to the waste. Grain is carried to the distant market, as also fattened animals, and consumed there; all of which is so much lost to the soil, and unless they are restored, will become so deficient as to leave the soil entirely exhausted. It becomes necessary, therefore, to resort to artificial manures to supply this loss, and the scientific farmer will use the greatest care to convert every convertible substance into food for his crops.

But as well known as it is at the present day that the liquid are of more value than the solid contents of the yard, it is matter of no little surprise that some men, in building their stables, select the very top of some hillock, for the express purpose, as it would seem, of draining off all the fluids that would otherwise collect about them, and in this way lose the greater and the better part of their manure. Wherever the yard is situated, it should be made lower in the centre than at the sides, and well paved with stones or a solid bed of clay. This will serve as a basin to hold all the drainings of the stables, and here they may be mixed with the solid manures : this will prevent the fermentation which they will undergo if collected in pools or tanks. If such are used, it should only be for the purpose of saving these liquids in order to restore them again to the dung heap. Much valuable manure is every year lost to the farmer, who is careless as to the preservation of them.

A number of methods have been recommended for preserving their active properties, where the substances themselves are not wasted. They are disposed to undergo a change in a few hours; and any one will be aware of this fact, who reflects upon the powerful odor of ammonia which is constantly rising in his stables. This is the result of the decomposition of the urine of all animals, which contains substances rich in nitrogen; and being very volatile, it escapes into the air and is lost, unless it is fixed by the application of some substance which will unite with it or absorb it. Gypsum has been recommended, to be sprinkled freely every day upon the floor of the stables. Others have advised that the floor should be sprinkled with a strong solution of common salt in water, which will act in a similar way. Saw-dust or chaff, or such substances, which will absorb the liquids, answer a very good purpose, as thus they may be carried out and mixed with the contents of the yard.

It does not answer, as was said before, to collect it in a mass by itself, but it should always be largely diluted with water, or absorbed by some substance which will fix it, either by forming a chemical compound, or by holding it in its pores, or should be mixed with substances which will absorb the gases as they are formed. Where charcoal can be procured in sufficient quantity, it will be found valuable for this purpose. This has the power of preventing its decay, and of holding a large quantity in its pores, till it can be spread upon the land to be washed out by the showers; or if it should undergo decomposition, still the charcoal may absorb a vast amount of the gases, and preserve them until they are required for use. When this can not be used, peat will be found an excellent substitute. But in any case these liquids should always be mixed with the solid manures, before applied, especially if they are collected in large quantities. They are too powerful to be used alone, unless very much diluted.

A preparation of urine, under the name of *urate*, has been made by mixing with it one-seventh of its weight of powdered gypsum, and, after it has stood for a few days, pouring off the liquid; but in this way, much of the useful matter is lost.

What immense quantities of this kind of manure are yearly suffered to waste! How few the farmers who make any effort to save it, or fix the least value upon it! In Flanders, the recent urine of one cow is valued at forty shillings a year (Johnston). What then will be the amount of waste, upon any moderate sized farm, let each owner calculate for himself. At very little expense the whole might be saved, and a large sum added to the gains of the farmer. Tanks should be constructed in the vicinity of the stables, with suitable conductors, which would receive it, whence it may be pumped out and applied to the compost heap, or even to the common mass of manure in the yard.

NEW BOOKS.

THE AMERICAN SHEPHERD. By L. A. MORRELL. 12mo. pp. 437. Harper & Brothers.

WE believe Mr. MORRELL's book to be an excellent treatise, embracing in its range the history of the sheep, the best and most approved modes of management in health and disease, their breeds and their relative value, etc. In illustration of his subject, Mr. M. has furnished portraits of the different breeds, and woodcuts showing the anatomy and structure of the most important organs of the animal. In an appendix, we find a series of letters from distinguished breeders and wool-growers, relating to the individual management of their flocks. To the reflecting mind these letters are quite important, coming as they do from experienced gentlemen located in different parts of the country: they furnish a great amount of useful and practical information, as well as hints and suggestions which may be acted upon and applied to the circumstances of each individual case.

The agricultural press has spoken, we believe, uniformly in commendation of this work. We have not ourselves had time to give it that thorough study which is required in order to point out what is most valuable in the book, or wherein it is defective. In reading it cursorily, we observed frequently words and phrases which we thought might be improved, so far as composition is concerned. The work evinces much labor and research, and indeed expense, as any one may satisfy himself if he will but consider the amount of correspondence it must have required to procure all the facts necessary to be used in the compilation of a volume which gives satisfactory information upon so wide a range of inquiry as is embraced in the subject of sheep husbandry. The publishers have executed their share of the task in a beautiful manner: it is just such a book as we like to see, consisting of good white paper, and printed with a very neat and uniform type.

First Annual Report of the Geology of the State of Vermont. By C. B. Adams, State Geologist.

We are gratified in receiving the first Geological Report of Prof. Adams, just as our number was in press. On a hasty perusal, we find that Prof. A., with his assistants, have accomplished a very creditable amount of labor, during the season which has just terminated. The report contains an exposition of the economical geology of the State, embracing some of the results of examinations of the iron ore beds and veins, of those of manganese, and of the marbles and limestone clays and sandstones. In all of these materials, Vermont is rich. We have always believed that when carefully examined, it would be found far more productive in many of the most important substances, than has been expected; and that the survey will prove a most valuable means of developing, in a short period, the peculiar wealth of the State. We hope, however, that the survey may not be hurried to an end, and we are especially pleased to know that it is regarded with high favor by the most intelligent and influential men in the State. The people may well consider that the expenditures which will be incurred in this enterprize will be extremely small, in proportion to the benefits which will flow from its completion. There is an important consideration which is worthy of remark now, namely, that Vermont will soon have facilities to market for the many products of her mountains and vallies; that many of these products, which are now of but little value, will become important by the new means of communication with Boston and the larger cities of the State of New-York, which will soon be opened; and that enterprise and capital will be speedily doubled, by the discoveries of the survey, and the contemplated avenues to market. The farmer and mechanic, too, will feel at once the combined influence of these movements on their prosperity.

We agree, however, with President Hitchcock in his remarks in a letter to Prof. Adams (p. 67), that the chief use of the survey will consist in describing and arranging the substances already known, or only partially described and known; settling the characters of the rocks, so as to show what may and what may not be expected in them, and thus preventing useless expenditures; in making suggestions as to the substances only partially in use; and in awakening men, all over the State, in respect to the new things which may be considered as compatible with formations that exist within their territory.

# EXTRACTS
FROM
FOREIGN AND DOMESTIC JOURNALS.

[From the London Athenæum.]

TRANSACTIONS OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

CHEMISTRY.

Experiments on the spheroidal state of bodies, and its application to steam-boilers; and on the freezing of water in red hot vessels. By Prof. Boutigny.

Prof. B. proceeded to show, that a drop of water projected upon a red hot plate, does not touch it; but that a repulsive action is exerted between the plate and fluid, which keeps the latter in a state of rapid vibration. At a white heat, this repulsive energy acts with the greatest force, but ceases or becomes nothing at a brown-red heat. The temperature of the water whilst in the spheroidal state, is found to be only 96°, and this temperature is maintained so long as the heat of the plate is kept up. To bring the water to a boiling point (212°), it is necessary to cool the plate. These phenomena are explained by Prof. Boutigny, on the supposition that the sphere of water has a perfect reflecting surface, and consequently that the heat of the incandescent plate is reflected back upon it; and some experiments have been made which show that this is the case, the plate becoming visibly redder over those parts on which the vibrating globule played. Several experiments were made in proof of this necessary cooling, to produce ebullition. The red hot plate, with its spheroidal drop, was renewed from the spirit lamp, and after a minute or two, the water began to boil, and was rapidly dissipated in steam. Ammonia and ether were shown, although exceedingly volatile, to follow the same law. Iodine put upon the heated plate, became fluid, and revolved in the same manner as other fluids, no vapors escaping whilst the high temperature of the metal was maintained; but when allowed to cool to the point of dull redness, it was immediately dissipated in violet vapors. The nitrate of ammonia fused on the glowing hot plate, and vibrated with great energy; but on cooling of the plate, the salt entered into vivid combustion. The repulsive action was shown by plunging a lump of silver, glowing at a red heat, into water. As long as its bright redness remained, there was no ebullition; but as it slowly cooled, boiling took place. The application of these principles, involved in these phenomena that which appears in the tempering of steel. If a metal to be tempered is in a highly incandescent state, the necessary hardening will not take place on plunging into water. It is therefore necessary that a certain temperature should be observed. Experiments were made to show that the repulsive power of the spheroidal fluid existed not merely between it and the hot plate, but between it and other fluids. Ether and water thus repelled each other, and water rested on and rolled over turpentine.

The bursting of steam boilers came next under consideration, and it was shown that many serious explosions may be referred to the phenomena under consideration. In a great many cases explosions have occurred during the cooling of the boilers, after the fire was withdrawn. An experiment was shown in proof of the view of the Professor. A sphere of copper, fitted with a safety valve, was heated, and a little water put into it: it was securely corked, and withdrawn from the lamp. As long as the metal remained red, every thing was quiet; but on cooling, the cork was blown out with violence.

The concluding experiment excited great interest. The production of ice, in a vessel at a red heat, was so anomalous, that every one was desirous of witnessing the phenomenon. It was performed in the following manner: A deep platina capsule was brought to a glowing red heat, and at the same moment liquid sulphurous acid and some water were projected into the vessel; the rapid evaporation of the volatile sulphurous acid, which enters into ebullition at the freezing point, produced such a degree of cold, that a large lump of ice was immediately formed, and being thrown out of the red hot vessel, was handed round to the company.

On the chemical changes occurring in iron furnaces. By Dr. Lyon Playfair and Prof. Bunsen.

The object of the paper was to determine the gaseous products of hot-blast iron furnaces. It was found that the process of coking continued down in the furnace to the depth of 24 feet, but the distillation reached its maximum at the depth of 14 feet, and that the formation of tar took place at between 14 and 17 feet. A great diminution of oxygen is found to occur at those points where the gases become developed, and hence they pass away unconsumed or without undergoing combustion. It has been estimated that 91 per cent of the heating material is thus lost in the form of gaseous products. The authors suggest as a means of remedying these losses, to construct a canal just at the point where the gases are given off, for the purpose of conveying these products to other parts where their high heating and illuminating powers may be employed advantageously. These gases in combustion with a due supply of oxygen, would give a temperature higher than is necessary to smelt iron; and although the authors do not propose to employ them for this purpose, they however suggest the advantage of employing that waste material for heating steam apparatus, and many manufacturing purposes.

ZOOLOGY AND BOTANY.

The Rev. L. Jennings read a paper, on the Turf of the Cambridgeshire Fens. This turf was not formed of sphagnum, as most peat, but from various species of aquatic plants which had accumulated for a long series of years above the remains of forest trees, which lie buried at the bottom of the moor. There are two distinct kinds of turf, the *upper* and *lower*; the former is the more compact and heavy of the two; the latter consists entirely of the bark and wood of submerged trees. The turf is not now rapidly formed, on account of the improved systems of draining. Formerly it was supposed to grow about 20 inches in sixteen years.

Dr. Falconer said that he had observed in Cashmere, at the bottoms of the lakes, turf of a very similar kind to the lower bed just mentioned. It consisted of the remains of *Chara*, *Potamogeton*, *Utricularia* and *Nelumbium*. The inhabitants obtained it from the bottom of the ponds by means of rakes, and used it as fuel.

Mr. Babington stated that the character of the Scotch and Irish bogs was different from that of the fens of Cambridgeshire. He had seen peat procured from the bottoms of lakes, in the same way as described by Dr. Falconer in Cashmere.

Mr. H. E. Strickland had seen peat in Ireland converted into a substance as hard as jet, so that it might be used by the turner. The formation of peat threw much light on the formation of coal. There could be no doubt but that some of our coal beds were formed in bogs, whilst others were formed at the bottom of seas.

Mr. Selby had seen peat quite solid and yellow, like amber.

The Bishop of Norwich stated that the trees buried in the bogs of Lancashire, exhibited marks of being burnt, and many of them had on them the strokes of the axe.

Mr. Dowden pointed out the remarkable fact in Mr. Jenyns's observations, that the light turf was undermost.

Prof. Allman laid before the section a monstrosity, occurring in the *Saxifraga geum*. The three external verticels of the florets were normal; but between the stamens and pistil, there was developed a series of adventitious carpels, crowded upon the margin of the cup-like production which surrounds the lower half of the pistil. These adventitious carpels were characterized by their backs being turned towards the axis of the flower. The carpels bear the ovules on their margins, which acquired a very considerable degree of development, becoming completely anatropous like those in the normal ovary.

Prof. **Henslow** exhibited a specimen of the *Papaver orientalis*, in which the filaments of the stamens were converted into bodies bearing ovules.

On mineral manure. By Prof. Liebig.

Soils exist under varying conditions, being greatly influenced by geological and geographical conditions. They are improved by adapting to them those manures which these circumstances require. In a wet region, those mineral manures should be selected which are not immediately soluble, but which slowly decompose so as to meet the required exigency of the crop. This is proposed to be obtained by the manufacture of mineral manures under the guidance of this principle; and as each kind of grain requires in part different elements, or at least different proportions of the same elements, it is proposed to make manures specially adapted to each kind of grain. It was, in illustration of the above, pointed out that wheat, oats, leguminous plants and potatoes, each require a different kind of manure, to bring it to the highest state of perfection to which it is susceptible.

Coprolitic Nodules. From the paper of Prof. **Henslow**, we learn that these nodules abound in the Green sand, London clay and Red crag. It appears from analysis that these nodules abound in phosphate of lime, and may be used to advantage in Agriculture. They yield from 50 – 60 per cent of phosphate of lime. Equivalent formations exist in this country, and will probably yield the same substance.

Ashes of the Narcotic Plants. By F. C. Wrightson.

It is maintained that the great problem of the chemistry of the present day, in its application to agriculture, is to determine the conditions necessary for a soil to produce the largest amount of any given crop for the sustenance of man or animals. The solution of this problem will be made, when it is determined what mineral conditions are essential to obtain vegetables in their full perfection. The analysis of our cultivated plants will not be sufficient for this purpose; but it will be necessary also to analize the weeds which spring up among them, and which are unfit for the sustenance of man, for these also rob the soil of much that is essential to the perfection of our cultivated plants. Besides robbing the soil of elements wanted for the valuable ones, they also injure it mechanically, shading and otherwise interfering with their growth.

ETHNOLOGY.

Dr. G. R. Latham, *on the ethnography of the American languages.*

He opened by explaining the extent of the Esquimaux tongues, by pointing out the character of their locality as being one that we should naturally expect to find transitional to the Fo language of America and Asia: he stated, however, that they had been cut off on both sides by broad lines of separation. These lines he considered exaggerated. Between them and the Athabascan, between the Athabascan and Cooloch, between the Cooloch and Oregon, between the Oregon and Californian, he could draw no definite lines. The Californian passed into the Mexican, the Mexican into those of South America. On the other hand, the Curile, Corean and Japanese tongues were akin to the Esquimaux, and so were the Siberian. He was satisfied that the commonplace view was the true one; viz. that the Esquimaux languages connected the old and new worlds. He further added that the glossorial affinities of the Polysynthetic tongues were as real as their grammatical analogies. The American Minister (Mr. Everett) remarked that the divisions of Dr. Latham did not agree with those recognized by American scholars. He observed that the languages of the United States were classed in eight divisions; that between these there was certainly a general affinity, such as between the more distant languages of the old world; that the difference between the American tongues was not so great as to make against the general unity of the human race; but that still it was so great as to render the processes by which the alliances were shown between *them*, convertible towards showing alliances between any other languages whatever. He did not see in what sense Dr. Latham gave the word *affinity*, and desired to see the details by which eight isolated classes were run into each other, and the particular facts by which the current divisions were broken down. The contrast between the grammatical analogy and the glossorial differences of the American tongues was generally recognized.

GEOLOGY.

Remarks of the Dean of Westminster, *suggested by a lecture of* Mr. Murchison *on the geology of Russia.*

The Dean said, that it was not for him to eulogise the scientific merits of the address they had just heard. He might, however, be permitted to say, that it appeared to him that Mr. Murchison had, like a *soi-disant* old soldier, taken a rapid military glance over the wide extent of country, and caught, with singular felicity, its great and leading features; but in another view, all this was no military achievement. He had not, with purposes it might be hostile, surveyed that distant land, to discover its weak places for assault, to see where fire and sword and desolation could most easily be carried into the recesses of its national life: he had gone as a stranger, but as a friend, to tell the Czar what were the riches of his vast dominions; to the inhabitants of Russia, how they might best turn to account the natural blessings which a gracious Providence had stored around them. As this seemed to him to be closely connected with one special feature of this association, nothing in it had been pleasanter to him, and he doubted not to others, than the sight of so many foreigners, from every nation, gathered at this friendly meeting: they seemed to be the deputies from all the civilized world. And he was well convinced that there was great usefulness in this: the more the ties which bind society together are thus laced and interwoven, the better. The more men come to understand one another, the harder it is to divide and embitter them; and this on a smaller scale at home, as well as on a larger scale with foreigners and strangers, was the work of this association. Its very character was, for this very purpose, migratory, that it might be the means of bringing together the lovers of science in all the different centres of our widely scattered provincial life. In doing this, moreover, it achieved another good; for it thus tended to foster and nourish up many a scattered seed of philosophy, which, but for this care, would certainly have perished. Many who, from poverty, or want of acquaintance with the scientific, hardly dared to aspire to the cultivation of the science which they loved, were thus found out of their homes by somebody, had their tastes confirmed, their views enlarged, and their love of science fixed; as they heard the words and saw the sights which were now around them, and came to know the faces of these eminent philosophers, each one's heart kindled within him, and throbbed with secret consciousness that I too am a lover and follower of nature. And believing that these good results did follow from the existence of this association, he (the Dean of Westminster) was ready to welcome it to his own neighbourhood, although he was not ignorant of the reproaches to which it had been subjected. He need only say, that if he believed those reproaches, it would receive no welcome from him. He, with all whom he saw before him, would rather, far, be ignorant utterly of every scientific fact or principle, than have the simplicity of his faith in that which was dearer to him far than life itself, assailed or shaken. But he denied the truth of those reproaches: here, happily, they had not been put forward. He indeed must be a rash man who should dare to whisper, here at Cambridge, that there was any hostility or opposition between science and religion. Here, where the mighty Newton walked, reasoned and discovered; here, where he, *qui ingenio genus humanum superavit*, yet bowed himself as a meek believer before the Lord his God; here at least such aspersions, we might trust, would not be heard. But vented they had been elsewhere; and they therefore deserved a passing word. Of those, then, who argued thus, if indeed they did so in a real and honest though mistaken fear that the truths of religion might suffer by these inquiries, he would speak with the utmost tenderness. Feelings such as these, where they did really exist, were so closely allied to all that was sacred, that they should receive no harsh or scornful word from him. But whilst he was thus tender to the men, he was bound to deal fairly with their argument, and this he must contend was utterly futile. Instead of such sensitive fear lest this or that discovery might seem to contradict revelation being a mark of faith, he would contend that it was a mark of the want of faith. True faith would say, "These are God's two voices : both *must* be true." He who had a secret lurking suspicion that possibly, at last, revelation was not certainly true, he might tremble when he heard this or that discovery, and shrink from the leading of science, lest it should shake his faith ; and thus, therefore, would he (the Dean of Westminster) deal with such honest fears : he would not admit them to be the marks of a strong faith, but he would treat tenderly, as weak believers, those whom they assailed ; and he would endeavor to show to these, their victims, how unreal they in truth were, for most unreal they are.

There is no opposition between science and religion. Rather, he would contend, was science the offspring of christianity : christianity had developed within man the powers he needed to pursue science truly : christianity, and that only, had given to man the patience, humility and courage which could make him truly a philosopher. Only the christian man could look nature calmly in the face, and reverently and yet boldly compel her to disclose to him her secret laws. The unbeliever might look at nature as a compound of conflicting powers, bent on capriciously, or with a deeper malice, vexing and tormenting him ; or, with the sneer of the cynic on his face, he might resolve all into a purposeless, lawless chance : but he only who knows of a designer, can trace out the design ; he only who has the interpretation given him by revelation can trace in the marred, altered, disfigured works around, the true and all-pervading laws of the one Supreme and Universal Cause. And if, as he admitted, there was a temptation to unbelief, which in one way beset such studies, still this was no argument against their use ; it did but show that, like all other high and noble things, they might be abused as well as used. But the unbeliever who called himself a philosopher, was an unbeliever, not because, but in spite, of his philosophy : just so far as he was truly a philosopher, a simple, humble follower of facts, a tracer of God's book of works ; just so far was he in the right temper of mind to be a believer and a tracer of God's other book of revelation. No ! there was no opposition between true science and revelation. This fear was nothing more than the unreal phantom, which, in former and darker times, had led men to try to put down all knowledge of nature, lest it should at any time deny their own traditions, which they fondly put instead of revelation. It was the very same fear as that which had troubled the life and embittered the end of Copernicus and Gallileo. Instead of yielding to it, let them, under the wise restraints on theorizing laid down for them the other night by Sir J. Herschell, pursue calmly, humbly and patiently, their researches into nature: let them feel here that He who made light to be, and fashioned the eye to receive it, did mean that it should receive it; and that, in like manner, He who framed the mind of man, with its capacity for observation, and its deep longing to reduce all around him to some orderly arrangement and directing laws, and who stored the earth beneath him and the heavens above him with fit materials for observation and inquiry, did really intend that man should search them out, and read in all these revelations, and discover in these laws, the marks and evidence of His directing hand, who planned, created, and sustains them.

The British Parliament have made liberal appropriations, during its last session, to various scientific enterprizes. Among the objects provided for, are the following: £50,020 for rooms to be added to the British Museum; £6217 for the purchase of certain collections; £1500 for the National Gallery; £8850 for the geological survey of the present year; £5839 for the expenses of magnetic observatories at home and abroad; and £1500 for the monuments to Lord de Saumarez, Lord Exmouth, and Sir Sidney Smith, intended for Greenwich Hospital.

The Report by Mr. Watt on the Iron Trade in Scotland, read before the British Association, contains the following particulars: At the present moment (July 1845), there are extensive new iron works erecting in Scotland, and important additions are being made to the old furnaces now at work. The increase in the annual quantity of pig iron smelted in that country, in April 1845, amounts to 37.4 per cent.

The following remarks were made by Mr. Porter, in regard to the iron trade, at the close of the Report:

The iron made at the beginning of the present century, amounted

to	150,000 tons.
In 1806....	258,000
1823....	452,000
1825....	581,000
1828....	703,000
1835....	1,000,000
1836....	1,200,000
1840....	1,500,000

Mean height of the continents above the surface of the sea : By Baron von Humboldt.—Since immense and lofty chains of mountains occupy our imaginations, by presenting themselves as evidences of vast terrestrial revolutions, as the boundaries of climates, as great water-sheds, or as the bearers of different vegetable worlds ; it becomes so much the more necessary to show, by a correct numerical estimate of their volume, how small the whole quantity of the elevated masses is in comparison with the area of entire countries. The mass of the Pyrenees, for example — a chain, the mean height of whose summits, and the superficial extent of whose base, are known by accurate measurements — would, if distributed over the area of France, increase the height of that country only 115 English feet. The mass of the eastern and western chains of the Alps would, in the same manner, raise the height of the flat country of Europe by only 21·3 English feet. By means of a laborious investigation, which, from its very nature, only gives the upper limit, i. e. a number which may be smaller, but can not be larger, I have ascertained that the centre of gravity of the volume of the land which rises above the present level of the sea, is situated at a height of 671 and 748 English feet in Europe and North America, and 1131·8 and 1151 English feet in Asia and South America.* These calculations indicate the lowness of the northern regions ; the great steppes of the plains of Siberia are counterbalanced by the enormous swellings of the surface of Asia between lat. 28½° and 40°, between the Himalaya, the northern Thibetian Kuen-Lun, and the Sky mountains. We can, to a certain extent, determine, from the estimated amounts, where the plutonic force of the interior of the globe has operated with greatest power in elevating continental masses. The mean height of the non-mountainous portion of France does not exceed 512 English feet.

[From the New-York Tribune, October 18.]

AGRICULTURAL ITEMS.

The **Farmers' Club** held its regular semi-monthly meeting yesterday. The hour devoted to miscellaneous matters was fully occupied. An interesting paper on guano, and its application to plants, was read and commented on. It appears that the best method of using guano for horticultural purposes, is to dissolve one pint of it in four gallons of water, and use freely about the roots. A paper was next read, translated by Mr. Meigs, from the Paris Horticultural Review, on the palm and date tree, giving an account of the numerous varieties ; and another paper by Mr. Renier, on the cultivation of the potato, with some interesting statements regarding the cultivation of potatoes which he had imported from Madagascar. A letter from Brussels, addressed to the Club, was read, and contained an account of the annual meeting of the Agricultural and Floral Society of Brussels. Some statements were then made regarding the effect of galvanism on grape vines, which had been found to flourish wonderfully under its influence. A letter was then read from Lieut. Marshall, U. S. N., of U. S. Ship Portsmouth, dated at Rio Janeiro, detailing the results of his discoveries and investigations in regard to a new and valuable plant, the New-Zealand flax: he hopes to be able to send to the Institute a specimen of this plant. An invitation was received from the Westchester Horticultural Society, for a visit from the Farmers' Club, or a delegation from it, yesterday, and another from Flushing to-day: both were accepted, and delegates appointed to each. The subject of the preservation of fruit trees then came up, and was treated *de novo* in all its branches. The chairman, Col. Clark, having stated that coal tar had been found very efficacious employed about the roots of peach trees, suggested that this remedy be adopted and recommended by the Club. Dr. Underhill was afraid of doing so, as he knew that the coal tar, or residuum of bituminous coal, was a very powerful agent, and, in his opinion, must prove injurious if not positively destructive to the trees. In England it had been the practice many years to saturate fence posts in this bitumen, while hot, so as to render them impervious to moisture; and in the operation, many persons contracted violent inflammations in their faces, by the mere exhalations which escaped from it. Col. Clark withdrew his suggestion, and thought it better that farther experiments should be made before the Club endorsed the coal tar. He, however, alluded to the residuum produced by the Gas Works in Centre-street, where anthracite coal was used, and the carburetted hydrogen disengaged by the agency of fluid rosin. The Gas Works in Eighteenth-street were carried on with bituminous coal: of the tar thus produced, he knew nothing. Later in the discussion, a gentleman mentioned that he had kept a large peach orchard of over two hundred trees perfectly free from the grub for seven or eight years, by the use of hard soap freely rubbed upon the body and limbs of each tree. A committee was then appointed to consider the project of publishing in a volume the proceedings of the Club for the past year.

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* The corresponding amount for the whole globe will consequently be somewhat less than 1000 feet.

The regular topic of discussion was then announced — the cultivation of corn; and Dr. Field was called on. He stated that he had made close observations during the four or five years of his farming experience, and had become satisfied that the old system of cultivating corn was decidedly erroneous, although he would not deny that farmers were in the habit of producing very good crops in old times. During his first year he had followed the old system, and he did not obtain so much corn from ten acres as he now got from two. The old way was to begin by ploughing; then to hoe; then plough and then hoe again, and this sometimes done three times instead of twice. This, he was fully convinced, was a most injurious practice. In the first place, ploughing disturbed the manure buried with the turf which had been turned over, and permitted the volatile and nourishing gases, the essence as it were of the manure, to escape; and the process of hilling brought the roots too much exposed to the sun, and permitted too much moisture to gather round their extremities. In the next, ploughing cut off a great many of the little roots, which were all-important in the process of nutrition. His plan was to first prepare the ground *well;* manure it plentifully; plant the corn in hills about three feet apart, and six or eight seeds in each, not forgetting to manure the seed in each hill very powerfully. When it had fairly come up, he put in his cultivator, an excellent affair of his own invention; then hoed again; pulled out all but three or four stalks in each hill, and again applied the cultivator — sometimes a third time. He always cut his corn close to the ground.

Dr. Underhill agreed that the cultivator was much better than the plow: too much ploughing and hilling was very injurious. There was no danger of manuring corn too much. He stated that common bog swamp could be turned into excellent corn land, by first draining, cutting down the bogs, and then applying a light coat of four or five inches of sand; silex being a necessary constituent in the production of corn, especially in the stalk, enabling it to stand. From swamp land thus prepared, he had gathered eighty-five bushels of corn to the acre. As to cutting up corn at the roots, that had long been decided. Judge Buel had discovered, several years ago, that seven or eight per centum was gained in the grain by this, while the stalks were worth three times the money, six or seven tons of excellent fodder being produced from every acre.

Some farther remarks were made by different gentlemen, in regard to modes of cultivation, manure, preserving from crows, etc. etc.; and some fine pear grafts, inserted in the roots of the pear tree, and some Isabella grape cuttings, were exhibited by Mr. Kelsey. The subject for the next general discussion was then announced, the treatment of root crops for soiling; and the Club adjourned.

[From the Philadelphia Gazette.]

THE WEALTH OF A NATION.

We find the following excellent article on this subject in the Massillon (Ohio) Gazette of the 4th instant:

The wealth of a nation arises from the labor of its people, directed by intelligence: 19,000,000 of inhabitants in the United States, if they earn on an average 50 cents per day, obtain for 300 days an annual aggregate productive labor of 2,850 millions of dollars. Enormous as this sum may appear, it is not less the result of mere arithmetical computation; and in this we find the true secret of the

Wealth of Nations, and the true reason why misfortunes seemingly overwhelming are easily triumphed over by any nation whose industry has full and constant employment. If France, under Napoleon, wasted enormous sums in war; if her disasters in Spain, if her disasters in Russia, if the invasion of her territory by an innumerable host, and the tribute she paid to the allied armies, caused her an enormous loss of money, that loss was easily repaired by the masses of industry which the genius and the institutions of the same Napoleon had set in motion, and had rooted so deeply that not even such commotions could eradicate them, or destroy the daily exuberance of their fruits. The 800,000,000 of dollars lost by the contribution to the evacuating armies were easily recreated by eighty days labor of 38,000,000 Frenchmen, at an average earning of thirty-three cents per day; and scarcely a trace either of her losses or of her misfortunes can now be found in *la belle France*, whose governing monarch (a banker, a trader, a merchant, and a thrifty man), having learned in the school of misfortune the value of productive industry, is incessantly occupied in giving to the French people productive occupation, by protecting their home industry, and by unfolding the resources of the whole country; by a well digested and extensive system of internal improvements, carrying out (with the more modern inventions) the vast plans designed for the public welfare, by the towering genius and the practised talent of the mighty mind of Napoleon.

Occupation, then, constant occupation is the true source of wealth. If, by any blunder of legislation, if by any neglect or oversight in using the gifts placed in our hands by a kind Providence, we throw into idleness for one-third of the year our 19,000,000 of people, it is a loss to the country of the product of their labor for one hundred days; and if their average earnings, when occupied, are 50 cents per day (equal to 9,500,000 for every day), it gives for 100 days of idleness a loss of 950,000,000 of dollars.

By productive labor, we not only mean the labor of him that tills the earth and of him that saws wood and works by the day, but we also mean the labor of all who in any vocation (whether as merchants, lawyers, shoemakers, schoolmasters, seamstresses, or in any other way), present something so useful and so acceptable to some in society, that money is voluntarily and freely paid for the service by them rendered.

What we have stated is true of nations, as it is of individuals: industrious nations, like industrious individuals, invariably thrive; while idle nations, like idle individuals, are a constant prey to poverty, and to what is even worse, namely, to the numerous vices which are the natural offspring of the want of occupation.

It is by such considerations that we are led to appreciate as an estimable blessing, the permission to carry freight on the New-York railroad from Buffalo to Albany in the winter. The permission was granted by a law passed May 7, 1844. This law unfetters the industry of the west from its icy chains. It has opened a new field;

it has made it the duty of every press, and of every lover of his country, to impel the whole community to unfold the sources of constant occupation which it has placed within our reach. It furnishes us new sources of occupation in the summer, and sources of constant occupation at the heretofore dead season. The Ohio canals as well as lake are open one month earlier, and are closed one month later than the Erie canal. Two months in the year are therefore at once added to the capacity of the productive industry of the West; and as soon as the West wills it, four months more will be added in every year by the construction of a railroad (via Toledo) to the Mississippi river, with a branch from Toledo to Detroit. We say "as soon as the West wills it;" because, when in her might she wills to bespeak this great work into existence, no power on earth can arrest the execution of that will. The reasons in favor of it are so strong that they cannot, in this enlightened age, be resisted, when clearly and boldly held up to public view.

Let us at once avail, to the utmost, of the two months in every year already added to our active existence, and let us also avail of all the means within our reach to make every one perceive each individual source of wealth thus created. Let us also wake up the whole nation to the necessity of a railroad from Buffalo to the Mississippi, and from Toledo to Detroit; to its advantage in this time of peace to carry the mail, and to fructify the labor of the whole country; to its almost superhuman uses as a tower of strength, for it will give warning to one of the most powerful nations on the earth, that if she were to provoke us by an unjust war, public sentiment would pour upon this railroad an overwhelming force against her Canadian possessions.

To enumerate the various articles and the various occupations which, in all times, in time of peace as well as in time of war, will be favorably affected by the new system, would be to enumerate every article which we of the great West import, and every product which our prolific soil is susceptible of bringing forth. It would be like attempting to enumerate every thing which the ingenuity of man can create. Suffice it to say, that the capacity acquired by the new system of getting our supplies every day as fast as wanted and no faster, and the capacity also created by the new system of converting into money at our pleasure on the sea board whatever we may produce at home, will give active efficiency to our capital, to an extent which will tenfold our capacity for acting in the various new sources of industry, placed within our reach by the new system.

Let then the great West be awakened to the new duties of her position, by every one who perceives the boundless sources of wealth, prosperity, and good morals, which a kind Providence offers to us, by giving us the capacity of constant occupation throughout all the seasons of the year.

SPIRIT OF THE MONTHLIES.

[From the (New-York) Farmers' Library.]

FALL PLOUGHING:

UNDER WHAT CIRCUMSTANCES TO BE RECOMMENDED.

ON THE ILL EFFECTS OF PLOUGHING LAND WHEN WET.

THERE are few points of husbandry, about which farmers differ more in practice, than about fall ploughing; and this difference, like most others, occurs from want of reflection on the *principles* that should govern the particular case; or rather, we might say, from want of knowledge of the principles, or *reasons* involved in every agricultural problem. You shall sometimes see a farmer turning his "glebe" at every odd time he can catch of open weather, in fall and winter; while another, his next neighbor, does not strike a furrow; and yet both may be right, for both may have been taught by experience that his system is the better one of the two. But were they to exchange estates, they would, too probably, each carry his practice along with him, because his action had been the result of habit rather than of investigation; and so they would proceed until after some years of costly experiment, each would find that in changing his land he should have changed habits also. The truth is, that whether land should be ploughed up in autumn and exposed for amelioration to the winter's frost, or whether left undisturbed under whatever coating it may be wearing, depends on various circumstances, and especially on the natural texture and composition of the soil. These circumstances are so well explained in the following essay, that we have concluded to preserve it in the Journal of Agriculture. The reader will find in it also observations that cannot be too well remembered, in reprobation of one of the grossest blunders that a farmer can commit, that of *plowing his land when wet.* We have long been so well satisfied, from personal observation as well as by the common-sense view of the case, of the very pernicious effect of stirring land when wet, not only on the succeeding crop, but on the land itself; effects from which it sometimes does not entirely recover for years, that we take the first occasion, in a sense of duty, to impress it upon the reader, by the following forcible remarks on it in connexion with winter plowing. The rationale in both cases is here made apparent:

HOW TO AFFORD THE NECESSARY SUPPLY OF AIR TO THE ROOTS OF PLANTS.

BY MR. J. MAINE, BROMPTON.

THE breaking up, or turning the surface of cultivated land, either by the plow, spade, or hoe, for the reception of seeds or plants, is a process so universally practised and indispensable for the well-being of the crops intended to be raised thereon, that it may be deemed incredible that such a common and simple affair should not be universally understood. And yet it cannot be denied that many and frequent mistakes are committed in this matter, and these must proceed either from indolence or ignorance.

As the surface of the earth is the natural station for the generality of plants, and where they obtain the necessary elemental food requisite for their developement and maturation, certain conditions of the said surface are absolutely necessary. Humidity, heat, and air, in due proportions, are indispensable, both to the fibrous roots which are extended in the earth, and to the head which is expanded in the air. There is more danger, however, from an excess of moisture than from the extremes of either heat or air; because, when the soil is saturated with water, the access of the genial air and its gaseous properties is excluded, and the delicate fibres, imprisoned and choked, it may be said for want of breath, must, in such a case, necessarily languish. That a porous soil is requisite for the free growth of every plant is an axiom in cultivation, and on this axiom all our operations of ploughing, trenching, digging, etc. are founded; and, that no excess of water should at any time remain to chill, sodden, and consolidate the staple, draining in all its branches and modifications is had recourse to.

Soils are various in quality, and particularly in texture and consistency. The success of crops appears to depend as much on the texture of the land as upon any other property. For, where air and rain can permeate freely, a constant supply of both aqueous and gaseous nourishment is afforded, independently altogether of the richness of the soil, whether natural or artificial. While, on the other hand, if the soil be compact, baked hard by drouth, in consequence of its having been previously labored or stirred when too wet, no plant can possibly flourish. The conclusion, therefore, is, that the soil for any kind of crop should never be impervious to air from being saturated with water, nor impervious to both air and water from its dry adhesiveness.

Sandy soils, upon a gravelly or chalky sub-soil, are never liable to be drenched with water but only for a very short time after heavy rain, or sudden thaw when snow is on the ground. All the water absorbed by such a soil sinks deep into the sub-soil, and far below the roots of corn or any agricultural plant on the surface. Such a soil needs neither draining nor sub-soil plowing. Neither does it ever require to be exposed to the frosts of winter, or any kind of treatment by implements to produce amelioration. It is almost always in such an open friable state that it may be plowed and sown at any season, without risk of being plowed and harrowed into the condition of mud, or of being poached into the state of mortar by the horses' feet.

In some countries there are large tracts of such land, and on these farmers are generally fortunate men. The culture is easy, and executed at a moderate expense. The crops of turnips are heavy; and if, besides the ordinary supplies of dung and tail dress, the farmers can manage to give their fields a liberal coat of marl or reducible clay every eighth or tenth year, the heart and fertility of the staple is maintained unimpaired for ages.

In such descriptions of land, however, it often happens that beds of clay lie alternately with those of sand at different depths beneath the surface. These beds of clay, if the general surface of the farm or field lies sloping, crop out at different distances below each other, and above each the surface staple will be either occasionally or constantly wet. If a pasture, rushes will appear accompanied by the worst grasses, and herbage produced that will certainly rot sheep, especially if introduced from drier pasturage. If the land be arable, the crops raised thereon will be unequal; on the wet places, the corn will be either too rank and inferior, or fail altogether. In such cases, efficient under ground drainage is the remedy to get rid of the superfluous moisture, either by gently-falling, diagonal or direct channels. The proper direction of the drains depends on the depth, extent, and inclination of the beds of clay; and it is well to have a professional man to stake them out, unless the tenant has a sufficient knowledge of geology himself. It is surprising to those who know but little of the nature of the various strata of the earth's surface, how easy it is in some cases to get rid of surface water. For instance, if there be wet and dry places on the same field, the owner may be assured that a bed of clay, or other kind of earth impervious to water, lies beneath the wet, and a porous sub-soil beneath the dry places. A drain of sufficient depth opened (and filled nearly to the surface with stones or loose gravel) from the wet to the dry places, will certainly render the whole dry. In my own practice, and acting on this principle, I have been in many cases very successful in laying arable fields dry. Two cases I may mention as examples: A field of eleven acres, of a fine loam, suitable for wheat, beans, or indeed any other crop, had a hollow near one of the ends, which was every winter filled with water, and ruinous to wheat or grass, very frequently to the extent of between two and three acres. This I resolved to drain. A neighboring farmer predicted that the attempt would be a failure; because his father, when tenant, sunk a shaft to the depth of above seventy feet, in the lowest dip of the hollow, and filled it with stones, expecting that this would form a *swallow* for all the rain and melted snow retained by the hollow. But this expectation was not realized; the water first filled the pit, and then flowed over the land as before. The cause was easily comprehended; the pit did not reach to the chalk rock, nor did it pierce through any porous stratum; its loamy sides and bottom were perfectly water tight, so that little or none could escape.

My plan was different. I saw marks in an adjacent field of where chalk had been drawn at some former time; thither I opened a stone-filled drain below the plowshare, from the lowest dip of the hollow; and when the water had accumulated, it ran towards the old chalk pit, but totally disappeared long before arriving at the place, and thus was a valuable field laid dry. Another arable field contained a pond which very often overflowed its boundaries. Lower ground was at the distance of half a mile; and the expense of forming so long a drain prevented all attempts to get rid of the annoyance. I advised the tenant to dig a deep drain from the pond up into a high bank of gravel, into which the water oozed away immediately; and ever after carried off all excess. By this simple expedient a large piece of excellent land was reclaimed, and brought into a regular course of culture at a very trifling expense.

It is by such means that land, naturally friable and loose in texture, may be relieved of superabundant water, and give admittance to the necessary supplies of air at all times. I have already observed that sandy soils require no exposure for the purpose of reducing adhesiveness either by the action of frost or machinery; and yet we often see such land carefully fallowed up in the autumn, and even laid in ridges, to receive the advantages supposed to be imparted to it by the contact of frosty air. That such an idea, namely, that arable land is benefitted by exposure to frosty air, has been long entertained, is evident from what has been written on the subject by old authors. Even our amiable poet, Thomson, in one of the flights of his pregnant imagination, says,

> " The frost-concocted glebe
> Draws in abundant vegetable soul,
> And gathers vigor for the coming year."—*Winter.*

Showing that the notion was held by philosophers as well as cultivators; and, at the present time, there are many among the latter who mistake the disrupting, ameliorating effects of frost on tenacious soils for its enriching property, which they imagine is communicated to all soils. But this is a mistake: the less light sandy soils are exposed to the sun and air, the less are they exhausted of their humid riches. Their best qualities are as liable to be washed away by winter rains as dissipated by the summer sun; and, therefore, they cannot be too close and level during winter, if it is intended that they should be cropped in the spring.

I have often noticed the mismanagement of a field of light soil by the following culture: It was fallowed, cleaned, dunged, ploughed, and sown with tankard turnips about the middle of June. The crop was abundant, and a flock of full-mouthed wethers was put on in the end of September. Within a month, the turnips were eaten off, and the field was ploughed into single 'bout ridges to lie for the winter. In April, the ridges were ploughed and harrowed down, and barley and seeds were sown. Both rose well; but, throughout the summer growth, the ridges were as visible in the crop as they were after the plow, the centres of the ridges bearing the finest and strongest plants of the crop. And the reason was obvious: the centres of the ridges came up fresh, moist, and mellow; while the intervals were filled with the bleached dry crests of the ridges, which, though more pulverized, were much less fertile and stimulating than the fresher portions of the surface. Hence it was quite evident that if the whole field had been permitted to lie undisturbed till the spring, the crop would have risen more equally and much more vigorously. I have seen fields of similar soil sown with oats after wheat; a bad custom, certainly, and as badly executed; the wheat stubble being ploughed in October, and the oats sown and harrowed in February; whereas, had the wheat-stubble been only scuffled off and harrowed to bring up a crop of seed weeds, and so rested till February or March, and then ploughed and sown, the crop of oats would have been much more abundant both in straw and corn than by the former method.

Here it is necessary to observe that, as I set out with showing how absolutely necessary an open porous soil is to all vegetation, and no measures being recommended in the above statements for that purpose, but rather the contrary, it is to be remembered that I have been treating of sandy land, which is at all times, except when too wet, sufficiently porous for the reception of air. But in other descriptions of soil, such as that whose particles are minute and have a tendency to adhere closely together, either by gravitating subsidence or by a flow of rain water; in such a case, every practicable means must be taken to alter and break this solidifying nature of the staple, in order to admit a free range of air and the gases it contains.

There are many intermediate descriptions of soil between sand and clay, and all of these, according as they approach to the one extreme or the other, require a peculiar management. But the grand object is to work the soil in such a manner that it shall always be pervious to air, rain, and all atmospheric influences; and this result is obtained by the *timely* application of the implements, rather than by the efficiency of the implements themselves. The soil is sometimes in a fit state to be worked, and very often is not. Under such circumstances, the judgment of the cultivator must be exercised. The condition of the land depends very much on the season and character of the weather; and on this account, seed time cannot always be commenced at the times which would be most convenient to the farmer. In such a case, he must wait until the land is in right order to be stirred; and that state is when it is neither too wet nor too dry. I am alluding to land which has either been thoroughly drained, or which needs no draining, and is only affected by the season, whether very wet or very dry. But as the exact time cannot always be hit upon, it is better that the arable surface be rather too dry than too wet when moved. Because, if too dry, it may be reduced to the necessary fineness by labor, and will then be in the best possible state for the reception of seeds; the interstices between the particles of the soil being filled with air, amid which the imbedded seeds germinate in the greatest vigor. But if the soil be too wet when moved, and especially by the pressing or pushing action of the plow, it acquires from the excess of water, a state of fluidity, like mortar, and settles down again so compactly that no seed laid therein can be developed in a healthy condition, in consequence of the want of air.

That the contact of air to the roots of plants was always considered necessary, is evident from old writings; but the fact has never been so generally noticed and acted upon as it is now. The first and most striking instance confirmatory of the opinion, was the fact of large full grown ornamental forest trees having been killed by their roots being too deeply covered up with earth when levelling lawns; and planters and gardeners have been long aware of the injurious effects of planting as well as sowing too deep. The same individuals formerly fancied that their prepared composts, for exotic or favorite flowering plants, could not be too finely sifted for their reception, whether in pots, or in the open ground. But slovenly or careless management in these particulars showed that too much nicety of execution was not at all necessary. Sifting the composts was given up, and composts made up chiefly of nodules of turf, broken stone, brick rubbish, etc. are substituted with evident success; and the cause is obvious: when the compost is sifted, it becomes a solid mass, especially after it is watered, and repulsive of all atmospheric influences; whereas among the loose materials, a considerable body of air reposes, and in this the more active fibres extend themselves much more luxuriantly than they do in compact soil.

The gardener's improved practice is only another proof how much a porous soil and presence of air are necessary to the roots of plants; and yet we often see the most luxuriant vegetation produced by soils which are apparently very close in texture, viz. alluvial soils and fertile clays. Both these descriptions of soil being composed of the finest atoms, become exceedingly close and compact if undisturbed; but when ploughed, or otherwise moved periodically, the stirred portion attracts as much of the qualities of the air as suffices for the following crop. It is rather remarkable that, while oak thrives best on a clayey subsoil, it does not seem to affect rich alluvial land; and this I imagine to be entirely owing to its closeness of texture preventing all access of air to the place of the roots.

Aquatic plants which live entirely submerged, although defended from external air, receive as much as they need from the surrounding water, which always contains a notable measure, besides nutritive bodies in solution, which form the pabulum of plants, whether aquatic or terrestrial.

Another tribe of plants are attached to earth, but so slightly that their system of roots is nothing compared with the bulky heads sustained; and as these plants are mostly found on rocks, or on the driest tracts of country, it is evident that the greatest portion of their nutriment is drawn from the atmosphere. Another tribe of curious and beautiful flowering plants is called Epiphytes [or parasitical plants, as the Misletoe], because they attach themselves to the stems and branches of trees, not to sustain themselves by extracting their juices, but to be supported in the deep shade and moist air of thick tropical woods. Some of these are called *air plants*, and grow as well in a basket without earth, suspended in a warm, damp, shady place, as if they were in their native habitat.

Thus we see that air is particularly necessary to plants, and as much so to the roots as to the head and foliage; and it is this fact, as already observed, that justifies all the means of cultivation which we have recourse to with a view of rendering the staple more loose, and consequently more permeable to all atmospheric influences.

There is one circumstance, however, which deserves to be noticed along with these general remarks: it is this, that all seeds require to be closely embedded in the soil. that is, they should be in close contact with the mould all round; and, that this should be completely secured, some seeds require to be laid in *heavy*, as wheat for instance. Now we have only to consider that as the soil has been previously prepared, and more or less reduced to the finest practicable state, a considerable volume of air is incorporated therewith; and that this air, according to its temperature and the moisture of the soil, facilitates the germination of the seed, and continues to assist the developement of the plant. To obtain this close embedding of the seed, it is the practice to tread it in;—a practice which is found of service to wheat, peas, beans, and almost all small seeds; but which would be of no avail without the previous disruption and aeration of the soil.

All these matters premised, it only remains to conclude with a general declaration that, in all our practices and means employed for the amelioration of the land, every thing that can be added or taken away, every operation performed, and every implement used in the culture, should all have for their ultimate object, either directly or indirectly, the breaking up of the compact and impervious surface, so that copious and constant supplies of air may be freely admitted to the roots of the plants.

[From the Albany Cultivator.]

SPECIMENS OF SOILS FROM WISCONSIN.

The samples of soil alluded to in the following letter, were handed to Prof. Emmons, by whom they were subjected to an analysis, the results of which, with accompanying remarks, will be seen in the subjoined article. The Professor's remark that "it would be easier to make suggestions on the spot than at a distance," is obviously correct, and should always be borne in mind in soliciting information on such subjects.

Geneva (Wisconsin Territory), May 27, 1845.

Mr. Tucker — I take the liberty to send you a sample of marl found in this vicinity, and also a small quantity of the soil taken from my farm, both of which I wish to have analyzed.

My object is to ascertain, in the first place, the nature of my soil, that I may be able to apply such manures, if they are within my reach, as will be most likely to facilitate the growth of wheat; and I wish also to know whether this marl will probably be valuable as a manure on such soils as mine; and will charcoal be likely to increase the wheat crop here; and you will confer a great favor by suggesting any thing that would be of service in the cultivation of our great staple.

Such lands as mine in their present state, will yield about twenty-five bushels to the acre, with good cultivation, without manure; but I suppose the average is not over fifteen bushels, under our present poor management. I wish to see what can be done on our new lands in increasing our yield of wheat, and intend to make my experiments with care, and keep an exact account of expense, that I may determine how well we may cultivate our new lands and make it pay.

You will oblige me much by assisting me to obtain such information as will enable me to start right in this matter.

C. M. Goodsell.

To C. M. Goodsell — I hereby acknowledge the receipt of two specimens, one of soil, and the other what was supposed to be marl. I have analyzed both, and below I give you the results. The soil is extremely fine, and very different in this respect from any of the soils of New-York or of New-England; as the latter are always coarse, or at least when compared with that from your farm. It is of the color and appearance of ground emery; it will all pass through the finest sieve. When examined under the microscope, a few white grains of quartz may be seen, the largest of which are about the size of a mustard seed. If this is a sample which represents the soil of your farm, its fineness is its most characteristic property. It will lie too compactly after it has been cultivated for a few years longer, or when its vegetable matter is expended, and will require more strength of team to plough it than coarse soils. It is evidently silicious, and seems to be a fine sediment which was deposited far from land and in a deep sea.

Analysis — 100 grains gave the following result :

Water	5·00
Vegetable matter	9·50
Silex	80·21
Carbonate of lime	1·08
Phosphate of alumine and lime	0·50
Protoxide of iron and alumine	3·62
	99·83

The so called marl is really *tufa*, and is composed of 97 per cent of carbonate of lime. Some parts of it are entirely soluble in warm muriatic acid ; in others, there is a sediment of silicious matter. It is to all intents and purposes a pure carbonate of lime, and may be used for quicklime for mortar, water or agricultural purposes.

The questions which are put in your letter are not easy to answer, inasmuch as the composition of the soil is not defective. The way to improve it, as it appears to me, is to add coarser materials to it, that is, improve it mechanically — as fragments of old brick, pottery, plaster, broken stone, etc. ; also coarse charcoal, bones. A good plan would be to add the broken tufa without burning. I feel that it would be easier to make suggestions on the spot than at a distance ; for, after all, local circumstances must greatly modify the treatment in any given case. E. EMMONS.

[From the same.]

GESTATION OF COWS.

MR. EDITOR — While living on my farm, I found it not only useful, but very necessary, to keep a record of the time my cows were put to the bull, as well as the time of calving. By the means of keeping a record, I was enabled to make a calculation on the probable period parturition would take place, and be prepared for the event, and avoid accidents which might occur when no attention was paid to the subject.

The experiments and facts which I am about to state, may not be considered of much importance to farmers generally, but to the breeders of cattle, and the inquiring mind, they may, I trust, be interesting ; and some good may possibly result from their publicity.

Earl Spencer, in a paper communicated to the "Journal of the Royal Agricultural Society of England," says the shortest period of gestation, in which a live calf was produced, was 220 days, and the longest 313 days : difference 93 days.

M. Tessier, in a memoir read to the Royal Academy of Sciences at Paris, says that in 1131 cows, which he had the opportunity of observing, the shortest period of gestation was 240 days, and the longest 321 : difference 81 days.

Both of the foregoing statements differ from my experience. Among my cows, though numbering only 62, the shortest period of gestation was 213 days, and the longest period was 336 : difference 123 days. But as regards the shortest period of 213 days, I must confess I have had my doubts as to the correctness, though I kept the record myself, for in no other instance have they fallen below 260 days.

It would appear from the Earl's statements, that a calf produced at an earlier period than 260 days, must be considered decidedly premature ; and any calf produced at any period of gestation exceeding 300 days must also be considered irregular, but in this latter case the health of the produced is not affected.

There are some facts presented in my record, which differ from any statements which have fallen under my observation. For instance, in 1839 I had fourteen cows, three of which produced heifer calves ; and the period of gestation averaged 284 days, while the other seven produced males, and averaged 280 days. This, in regard to the time allowed for males and females, is contrary to the prevalent belief among farmers, and differs very materially from the result of the following year, 1840. I had that year thirteen cows, six of which produced heifer calves, whose period of gestation averaged 278 days ; and seven produced bull calves, averaging 299 days ; the shortest period of the heifer calves was 213 days, and the longest 336 days, being the greatest extremes of either year. The shortest period of the bulls was 278 days, and the longest period was 289 days. In this year the number of males and females were nearly balanced.

The next year, 1841, eleven cows produced eight heifer and three bull calves. The shortest period of gestation for the heifer calves was 277, and the longest 292 days, averaging 286 days. For the bull calves the shortest period of gestation was 284, and the longest 299 days, averaging 293 days.

In 1842, the order seemed to be reversed ; for out of thirteen cows, nine produced males, and four females. The shortest for the males was 281, and the longest 294, averaging 287 days. There was but very little difference in the time for the females ; the shortest period being 280, and the longest 286, averaging 284 days.

In 1843, the proportion of males to females, was, as in 1840, nearly balanced. From eleven cows, six male and five female calves were produced. The shortest period for the males was 277, and the longest 290, averaging 282 days ; and the shortest period for the females was 276, the longest 286, averaging 282 days.

In the five years, which embraced my experiments, sixty-two cows produced twenty-six females, and thirty-six male calves ; the period of gestation for the bull calves averaged 288 days, while the heifers averaged nearly 283 days.

In the experiments of Earl Spencer, of those cows whose period exceeded 286 days, the number of females was only 90, while the number of males was 150. Now, in my experiments, of those cows that exceeded 286 days, the number of females was 7, while that of the males was 12. The number of female calves produced under 283 days was 24, while that of the males was 31. In most cases, therefore, 283 or 288 days may be assumed as the usual period for gestation, and not 270 days, as stated in Youatt's work on cattle.

My experiments were not confined to any particular breed or variety of cattle: they consisted of durhams, devons, herefords, ayrshires, and grades; and I think these results, though derived from the observations of one person only, will be found equally applicable; at any rate, we should be pleased to hear the results of others. C. N. Bement.

American Hotel, Albany, July, 1845.

[From the same.]

SELF-ACTING PUMP.

Luther Tucker, Esq. — It is with much pleasure that I comply with the request of a gentleman connected with your journal (Mr. Howard), in furnishing a few statements in regard to a new self-acting pump which I have lately set in operation, and which, I think, promises to be of some value to the public; and to no portion of it more so than to agriculturists. Notwithstanding the multitude of ingenious contrivances which have hitherto been devised for obtaining water for economical and ornamental purposes, the most valuable is the old and simple plan of bringing it from some neighboring spring or water-course which flows upon a higher level than that on which the supply is needed. This method, although frequently attended with considerable expense, is almost universally adopted where it is practicable, in preference to the best constructed pumps for raising water from a lower level to a higher. The situations, however, where this plan can be adopted, are not numerous, except in mountainous regions. Buildings occupied as dwellings, or otherwise, except in such places, are generally located on high ground, where water cannot be procured by an aqueduct or conduit pipe. In such places it is universally obtained from wells situated on such high ground, and in innumerable instances in the immediate vicinity of ravines and small vallies deeper than those wells. In such cases it is obvious that a syphon might be led from the bottom of a well over into the low ground, the current through which syphon would afford a mechanical power, which, if it could be economically applied, would be sufficient to raise a steady and perpetual supply of water upon the elevated level where it was wanted.

These considerations induced me some months since to consider whether a syphon might not be so constructed as to discharge water at the summit of its curve, that is, at the highest point in the pipe of which it should be constructed. The idea at first appeared somewhat absurd, as those who are acquainted with the operation of the common syphon may suppose, inasmuch as in no point of a syphon is there so strong a resistance to any force tending to divert a portion of the enclosed fluid from the pipe than at the summit of the curve. The problem, however, is solved, and the contrivance which has accomplished the solution has been tested, and proved perfectly successful. The preponderance of the column of water in the longer leg of a syphon, which I have recently laid from a well fourteen feet deep, over into a neighboring ravine twenty-two feet deep, furnishes a sufficient mechanical power to deliver about one-third of all the water which enters the pipe at the bottom of the well, at the summit of the curve, two feet above the mouth of the well. The length of the pipe which goes down into the ravine is about ten rods, more than half of which distance it is laid in ground nearly level. The shorter leg of the syphon descends perpendicularly into the well, and is constructed of lead pipe of an inch calibre. At the summit of this pipe, and connected also with the pipe which passes down the hill-side, is the apparatus for discharging the water, of such dimensions that it might be enclosed in a cubical box ten inches square. I have omitted to mention that the pipe which passes into the ravine is about three-fourths the calibre of that which descends into the well.

The amount of water discharged by the apparatus, two feet above the level of the ground at the mouth of the well, through a half-inch pipe with a free aperture, is a little more than a gallon per minute. If the pipe is laid upon the ground, and its adjutage contracted by a jet tube with an aperture of one-eighth of an inch in diameter, the jet rises seven feet and a half above the mouth of the well; with another jet tube of one-sixteenth of an inch in diameter, it rises thirteen feet; and with another of one-twentieth of an inch diameter of adjutage, between eighteen and nineteen feet. Indeed there is no definite limit to the altitude to which water might be raised by this method, if the size of the syphon be increased, and a sufficient supply of water obtained for working it.

It may appear incredible that a syphon can be so constructed that no definite amount of pressure shall be sufficient to restrain the escape of a portion of water from an opening in the summit of the curve, while in the ordinary syphon, a very small aperture at that point, communicating with the open air, destroys its action instantly; yet this apparatus demonstrates that it can be accomplished, by an extremely simple and compact contrivance, and on any scale that may be required, from a miniature model that will discharge its gill per minute, to an engine that will elevate a hogshead of water in the same space of time.

The apparatus is, moreover, so extremely durable, and so constant and certain in its operation, that it furnishes all the advantages of an aqueduct which brings water from an elevated level. The invention is capable of application to any good well or water-course, which admits of the operation of a syphon, even though such well or water-course should be a hundred rods, or more, distant from the lower level which should furnish the working power.

When applied to wells, I think it cannot fail to improve the quality of the water, as it is constantly changed and kept in motion.

Such an invention, if successful, places at the disposal of thousands of farmers, manufacturers, and gentlemen who appreciate matters of taste and luxury as highly as those of mere utility, a supply of water for use or for ornament, which it would be impossible for them to obtain in a more simple, cheap, or economical manner.

When my arrangements are completed for offering my invention to the public, I shall be happy, with your permission, to avail myself of your valuable journal, for the publication of a more minute description of this syphon, accompanied perhaps with a drawing. In the meantime, I shall take pleasure in showing the practical operation of the one which I have already constructed, to any of your numerous subscribers who may be sufficiently interested in the foregoing statements to call and see it.

I am, sir, most respectfully yours,
ERASTUS W. ELLSWORTH.
EAST-WINDSOR HILL (Connecticut), July 18, 1845.

[From the same.]

FOOT-ROT (SO CALLED) IN SHEEP.

LUTHER TUCKER, ESQ. — A late number of the Boston Cultivator contains an article on this subject from Mr. Jewett of Weybridge, Vermont, which induces me to send you this communication. The importance to the sheep-raising community of this whole continent, to understand the nature and causes of the many diseases to which sheep are liable, is incalculable; and, when well understood, they will be surprised to find the ease with which they can be cured, and in most instances prevented. When Mr. Jewett is informed that I was born and raised a shepherd, and that the little information I possess is the result of long and attentive practice, he will, I am sure, readily give me credit for the true intention with which I write, namely, to set him and others right, as to the true cause of, and remedy for, this (so called) disease, and not to find fault with him, or enter into any controversy about it; for I willingly admit that he gives evidence of some practice and observation, and that I believe it is only necessary to *direct* that observation to make him a valuable shepherd.

Properly speaking, there is no such *disease of itself*, as foot-rot.

It is invariably the result of the neglect of another disease, simple and easy to cure, or the result of accident by a bruise of the foot in some way, and always evinced by a slight but visible lameness in whichever foot is injured. It is *not contagious, neither can it be communicated by inoculation.* I saw the latter tested myself by the late Mr. Field, father of the present able veterinary surgeon, of London, on a visit to an extensive flock-master in Liecestershire; and I think by the time you read this through, you will be convinced yourself as thoroughly as though you saw the experiment tried, of the impossibility of its being so communicated, inasmuch as foot-rot is not a disease of itself.

Sheep have a secretory outlet between the claws, peculiar to them, which is liable to become obstructed; and when obstructed for a few days, the tender skin between the claws becomes red and inflamed, the sheep becomes lame on that foot, and more lame immediately after its first rising in the morning than at any other time of day; the inflammation making greater headway while at rest during the night, than at any other period. The watchful and observant shepherd will see the lame sheep at once on putting his flock up in the morning, and will apply the remedy, which is simple. First clean the claw by running your finger or thumb up and down through it, wet with your spittle, if you have no water convenient; then take out your bottle of spirits of turpentine, and wash it well with your finger with that; let the sheep lie a few minutes until the claw is thoroughly dry (I shall afterwards describe the simple mode of securing a sheep so as that it cannot get off its side until loosened by the shepherd), and then rub between the claw a mixture of two parts tar and one part sheep's suet boiled together, well blended and let cool, which the shepherd should always have prepared and in a tin box to take out with him. This done, let the sheep go to pasture again, and repeat the same dressing every second day until the sheep becomes well of the lameness, or until the skin breaks, which it sometimes will do in spite of the dressing, and assumes the nature and appearance of the disease called a scald, when you must then apply the liquid dressing described below. The scald is a disease of itself, though sometimes produced by the stoppage of the secretory outlet of the claws in the manner described above, is generally produced by very heavy dews, or a long continued series of humid weather, which predisposes the foot to this injury. It is as the other disease, first discovered by the shepherd from lameness, but at a different hour of the day. When the flock are first put up in the morning, the dew is heavy, is cooling to the foot, and washes between the claws clean; and though the scald has made its appearance, yet at that hour the moisture prevents the friction of the parts from hurting and causing lameness, and it is not discovered until towards noon, when the dew is all gone, and between the claws becomes dry, and the friction commences to hurt and irritate the parts, and then the lameness becomes apparent. When this is the case, the shepherd knows it is the scald. He collects his flock, catches the lame sheep, ropes them as it is termed, and lays them on their side. He then takes his wash, previously prepared, composed of two parts tar and one of oil of turpentine well mixed together, and then slowly added and stirred in; one part of muriatic acid (spirit of salt), with after that four parts blue vitriol, very finely powdered, to which add spirits of turpentine sufficient to make the whole, when well shaken up in a bottle, of a liquid consistency, so that the wash may be applied by dipping a feather into it, with which anoint the scalded parts with the feather. The bottle must be well shaken every time the feather is dipped in; and when the claws are dressed, the sheep must then lay tied until the wash is perfectly dried in, and a sort of incrustation is formed on the scalded parts: every second day is enough to dress. It sometimes occurs that notwithstanding every care, this scald turns to a *sore;* and then it is, that it is called the foot-rot The sore is produced generally by something getting in between the claws, such as a bit of gravel or hard clay, or struck by some substance that would produce extra irritation, proud flesh and sloughing. The treatment then is, if the sore extends either way to the horny substance, to pare it away to the healthy edge; then shake a little fine powdered loaf sugar on the part, which will entirely take away the proud flesh; and then after half an hour apply the wash, and, when dry, loose the sheep to pasture. Care should be taken never to wrap the foot with a cloth, unless when the horny substance is taken away and the part is left entirely bared to the ground, and then the one claw only should be bandaged; or if both are bared, *each claw should be separately bandaged,* to prevent greater friction of the parts, and to keep them the more cool. *Under this circumstance alone,* is a bandage on the foot of a sheep *ever admissible,* because it contains greater heat, and of course greater friction, by keeping the claws bound together and not allowing them to spread. In this stage of the disease, it is necessary to dress every day; and it must be noticed, that the cool of the morning is the best hour for dressing, because the sheep in hot weather is much oppressed by being tied down on its side for the length of time, sometimes an hour or more, that the proper application of the dressing requires. It not unfrequently happens that sheep show lameness, when you can neither see a scald, nor discover inflammation between the claws, from the stoppage of the secretory outlet; and then the shepherd must look for the cause by pressing and examining the hoof round, in the same way as the cause of lameness is sought for in the horse's hoof; and when discovered, the horny substance must be pared down to the part affected, and then the applications made as before described. In this case the lameness is produced from precisely the same causes as the lameness in a horse's foot, by a bruise or hurt, or by the prick of a nail, or the gradual working-in of some sharp gravelly substance, which, when discovered, and on opening, matter is found, it is immediately pronounced as foot-rot in the sheep; but who ever heard of foot-rot under similar circumstances in the horse, or who ever supposed that the matter, if applied to another horse by inoculation, would produce lameness and a similar sore, in the same region, the foot? On this I deem any other remark unnecessary. No other help than the shepherd and his dog is required; nor no other instrument than a strong, sharp and well pointed two-bladed knife, the large blade to pare down the hoof, the smaller one to cut out down to the part affected.

The way of tying down the sheep is as follows: Get a soft rope made of tow with three plies, each ply as thick as your middle finger, five feet long; then splice both ends together, and you have a double rope two feet six inches long. When you catch your sheep, turn him gently on his side; then raise him to a sitting posture, having his head bent over under your stomach; take your rope and put it over the *left* hind leg just above the hock, catching the sinew; then give your rope two or three twists, so as to confine the leg, and pass it along the belly and on the side of the chest close under the elbow of the *right* fore leg or shoulder, and pass the other end over his head on to his neck; lay him down on his side, and there he must remain secure until you choose to loose him. When you go to dress him or pare his hoofs, the easiest position for the sheep, and the handiest for the shepherd, is to place him in a sitting posture, the rope still left on until he is ready to be let out to pasture. The paring of the hoof can alone be well performed with a strong, sharp bladed knife, and is very simple: leave the bottom of the hoof as even as possible, so that the sheep may have an even and flat surface to stand upon, taking care of not cutting down to the quick; the toes should be left smooth and rounded, and no portion of the heel touched, unless some jaggy part is hanging.

The shepherd with his dog and crook, and twenty-four tow ropes on his shoulder, his knife and vials in his pocket, can go out and pen his sheep in any clean and convenient corner, catch the lame ones and rope them, let the rest of his flock out to pasture, and then in a very few hours dress his invalid sheep, and be prepared for his other work. Suppose the shepherd to have the charge of a flock of 1000 sheep, he must be very ignorant, or very careless, ever to require to use more than twelve or eighteen out of his twenty-four ropes on any one day: there is no business at which a man is engaged, that "a stitch in time is more certain to save nine," than in herding a flock of sheep.

With much respect, I remain, dear sir, your humble servant,

Louisville (Kentucky), July, 1845. GRAZIER.

[From the Ohio Cultivator.]

PLANTING STRAWBERRIES.

Every body loves strawberries, and the man who has a garden or a few yards of ground that can be appropriated to the purpose, and does not plant a good bed of strawberries, does not deserve to taste any thing better than "pork and dodger," during his mortal life! Don't you say so, boys, girls, ladies, *all?* Well, then, why don't you make a stir about it, and keep a stirring till the object is accomplished? Not quite yet, however; for the ground is too dry, and the sun too hot. But the latter part of September, or the fore part of October, as soon as the ground is well moistened through, and the heat of summer is over, is a first rate time to set out the plants. They will take root immediately, will bear considerably next spring, and abundantly the spring following.

If there is room for choice, select good deep loamy soil, rather inclining to sand than clay, and where it is well exposed to sun and air. Apply a heavy coat of rotted manure, from the stable or hog-pen, or both (mixed), and dig the ground deeply, burying the manure eight to ten inches deep; rake it smooth, and it is ready for planting.

Select plants from runners of this year's growth, and from beds that are young or in a healthy bearing state, otherwise many of them will be apt to prove barren and useless. As to the kinds, get any of the good sorts in cultivation that can be found in your town or neighborhood, and plant two or three kinds near together if you can get them, as they will assist in impregnating each other, and a larger crop will be obtained. If plants are to be obtained from a nurseryman, any of the following will be found excellent (the first named is finest of all, but should never be planted far separate from other kinds). Hovey's Seedling, Large Early Scarlet, Hudson's, Ross's, Phœnix, Keen's Seedling, Elton, Myatt's Seedlings; and for variety and late bearing, a few of the Red and White Alpine or Monthly.

In planting, set them in rows about two feet apart, and eighteen inches apart in the row. Or, if beds are desired, make the beds four feet wide, and set three rows on each; then leave an alley not less than two and a half feet wide between the beds. Keep clear of weeds, and if more plants are not desired, cut off the runners three or four times a year. A thin sprinkling of lettuce or radish seed may be sown on the beds the first year, but afterwards the strawberries will need all the space. It is a good plan to cover the surface between the rows with straw or hay at the time of fruiting in the spring, to keep the fruit clean, and partially to protect against drought.

[From the (New-York) American Agriculturist].

ROOT-GRAFTING.

After reading this article, every farmer can easily provide himself with an orchard of the choicest fruit, and without other cost than a little of his own labor; for he has only to procure a few apple seeds and sow them, and then do his grafting in the winter evenings, when there is scarce anything else to occupy his attention.

Root-grafting is now more generally practised than tree-grafting, for the following reasons. 1. It is stronger than budding, and the scions have as straight and handsome a growth of trunk as seedlings. 2. A tree may be brought to bear from one to two years sooner by this method. 3. It can be done in the winter as well as the spring, a season when the nurserymen are least employed. 4. Three times the number of trees can be thus obtained from the same stock.

Preparing the seed. Take apple-pommace at the cider-mill, and transport it to any place near where it is desired to plant the seeds, and spread it on the ground; then turn it over with a rake or pitch-fork, and gather the principal part of the straw from it, leaving the pommace in beds not more than one and a half to two feet thick. If left thicker, or much straw remains in it, the pommace heaps are liable to ferment and destroy the vitality of the seeds. Leave it in this state all winter, without covering. If the seed is to be obtained from any great distance, it must be washed clean, thoroughly dried, and then packed in a box for transportation.

Planting. The soil should be of reasonable fertility, and free from springs or standing water; indeed, it is better to have it too dry than too wet. As soon as the frost is out of the ground, plow, harrow, and prepare the land where the apple seeds are to be planted, the same as for a good crop of corn. Now stretch a garden cord any length required; take a hoe in hand; as you walk forward, let it be drawn behind you, straight with the line, and about one inch deep in the ground. This makes a drill six inches wide, and deep enough for planting the seeds. Into this scatter the pommace an inch thick, and then cover it over with the hoe about an inch deep. The drills should be from three to four feet apart, according as one has more or less ground to spare. The latter distance is best, because it gives more room between the rows to work the plow or cultivator, to stir the earth and keep the weeds down. If the trees come up thicker in the rows than wheat or rye usually does after sowing, they should be thinned out by pulling up whatever is necessary, and thrown away, as they will hardly repay the trouble of transplanting.

After culture. This may be the same as with a crop of corn. It is very important to stir the earth, and keep it loose, for the better spreading of the apple tree roots; also to check the weeds, otherwise they will choke the growth of the trees, and frequently overshadow and kill them.

Diseases and insects. Apple trees, the first and second years, are very subject to mildew, the attacks of lice, and a small green fly, which often do them great injury by checking their growth. For the destruction of the first, we recommend strewing lime and charcoal, mixed in equal quantities, along each side of the rows of the seedlings; and for the second, sprinkle snuff all over the leaves, or a mixture of sulphur, soot, and fish oil.

If in a good soil, and well taken care of, the trees will grow from two to three feet high the first season. Treat them the second year in the same way as the first.

Taking up and securing the trees. If the trees have had a good growth the first season, they will be large enough the following winter for grafting; if not, they must remain till the second fall. To prepare them for grafting, they should be taken up before the ground freezes. To do this with facility, run a plow down each side of the rows, turning away the soil from them, and then pull out the trees carefully by hand; or let two men go down on opposite sides of the row, and thrust their spades into the ground near it, loosening the soil and somewhat lifting it up, while a third person follows and pulls out the trees. After this, tie the trees together in moderate sized bundles, and put them into a glass-lighted cellar, or any place where they will be secure from frost or drying up of the roots. The cellar bottom must be of a dry soil. Here dig trenches, and place the roots of the trees in these, in bundles, and cover up till wanted. Or, if the roots can be kept moist by wrapping them in moss or any other way, it will answer, though covering them with earth is the safest and best method.

Grafting. As one has time during the winter, these bundles of trees may be taken from the trenches and grafted. From one to four roots may be cut from each tree, dependant entirely upon its growth, and still leave enough for the support of the stock taken up. This should be closely trimmed and cut off about two feet from the root, to be set out the following spring, to be budded in August. Now cut the grafts as wanted, and use ribands made in the following manner for bandages: Take common cotton cloth, and cut it crosswise into pieces six inches wide; on one side of these pieces, spread grafting wax, composed of 1 lb. beeswax, 1 lb. rosin, and 2 lbs. tallow: then cut these pieces parallel with their width, into ribands half an inch wide.

The most simple method of grafting, and as sure as any, when the roots are so small, is the splice or whip method. Some adopt cleft-grafting, and do not use wax or binding; but as the graft by this method is very apt to get displaced, we cannot recommend it.

After management. Take the trees after they are grafted, and put them into boxes of any convenient size six inches deep, and fill the same up with moist sand or light loam all around the roots, taking care to leave the top of the scion out a little above the earth. These boxes should now be taken to the green-house, and set in a shady place out of the way of the sun. Here let them remain till the graft gets well united to the root, which will take place in a week or fortnight, according to circumstances. After being united, place the boxes in the cellar, and let them remain there till ready to set out in the spring. During this time, keep the earth in the boxes moist. By giving the pieces an opportunity to unite, immediately after grafting, if it comes a dry time in the spring subsequent to setting them out, they are not so liable to die, and their growth is quicker and better. As few farmers have a green-house to start the grafts in, they may place the boxes containing them in a warm room during the day, and in the cellar during the night. Those who are not too busy in the spring, can do their root-grafting as soon as the frost is out of the ground, and set the trees out in rows as fast as done.

Transplanting. Early in the spring, transplant the grafted trees from the boxes into rows about four feet apart, and one foot apart in each row. Stir the earth occasionally, keep the weeds down between the rows, and let the trees grow till they are wanted to plant in an orchard. By this method, apples have been gathered three years after first saving the seed; and if properly attended to, one may always calculate on a little fruit the sixth or seventh year.

[From the same.]

FENCES.

We cannot do without some fencing in America; but to be *forced* to build *innumerable* lines of it in every direction, is a positive curse to the country, and a plague upon its morality and industry. It would be hardly possible for law or custom, in a free community, to invent and put in practice anything more burdensome, unjust, and tyrannical upon the agricultural class, than the present system of fencing. This may seem to our readers very strong language. It is so, and we mean it as such; nevertheless, it is bitterly true, every word of it, as we shall endeavor to show. It is a long conviction of its truth, and a knowledge of the deep hold that the apparent necessity of fencing their land has upon the habits and minds of the people, which compel us to express ourselves so decidedly against an odious and tyrannical custom, that has been forced without proper reflection upon the cultivated portions of North America ever since its settlement.

On the continent of Europe, fences are scarcely known; neither are they found in many parts of England, Scotland, or Ireland; and where they now exist in these countries the people are fast lessening their number, and we fully believe that half a century hence such a thing will scarcely be in existence.

The following are our decided objections to fences:

1. They are the occasion of more angry words and brutal per-

sonal conflicts, sometimes ending with the death of one or both of the parties to it, law suits, and lasting ill-feelings among neighbors, than all other causes put together.

2. They cost immense sums of money.

3. They take up at least two to three acres out of every hundred of the land.

4. They harbor large numbers of vermin, and are a complete nursery for bushes and every noxious weed that grows.

5. They are much in the way of plowing, harrowing, and otherwise working the land; and unless a considerable number of gates are erected along their lines, they make it inconvenient getting to the fields; and by the circuits which have to be taken, greatly increase the distances in carting out manure, bringing home the crops, and driving the stock to and fro.

6 They have a sensible effect in delaying the warmth of spring, by occasioning snow-drifts and water puddles. Land, for a strip of several feet wide, on the north side of the fences, does not become dry and warm and fit for working so soon as in the open fields, by at least three to seven days. This is frequently highly vexatious to the farmer, and positively injurious in causing delay in his plowing and planting.

7. They totally mar the beauty of the landscape, and make the fields look as if they were all *imprisoned.* Strangers coming among us from an unfenced country, unquestionably at first sight think us and our cattle awfully vicious to require such ugly hedging in and around.

All the above objections to fences, must strike the reader as so plain and forcible, that they need but one elucidation, and that is as to their cost; and for a calculation of this, we will take New-York as an average example of one twentieth part of the Union.

This State is supposed to contain a surface of 30,000,000 acres. Deduct one half for unenclosed lands and water, and it leaves 15,000,000. We are of opinion that the average size of fields here is about 15 acres; but we will suppose, for fear of making too large a calculation, that they average 20 acres. To surround one of these, allowing a trifle for inequalities of surface, it would require 230 rods of fence. On account of numerous roads and lanes, all of this does not answer for division fences; instead, then, of throwing half of it off for this purpose, we will suppose 110 rods enough, and call the remainder (120 rods) sufficient on the average for each 20 acre field. Dividing 15,000,000 acres by 20, they make 750,000 fields: these multiplied by 120 rods, the length of fence requisite to enclose each field, make 90,000,000 rods. Farm fences cost, in this State, from 40 cents to 150 per rod. We will suppose, on an average, that the cost is 75 cents per rod; this would amount to the enormous sum of $67,500,000 for fencing New-York alone. Now, allowing this to be one twentieth the cost of all the fences in the United States, the result would be $1,350,000,000! These enclosures, including stone and wood, do not last, on an average, over 25 years; the cost, then, is $54,000,000 per annum, which, with $81,000,000 of interest at 6 per cent on the first cost, amounts to $135,000,000 annually expended in the republic for fences! It is absurd to suppose that so much fencing is necessary; and we now respectfully ask whether, in the outset of this article, we too strongly reprobated the law and custom compelling the farmers of this country to submit to so grinding and odious a tax upon their industry?

[From the same.]

THE SWINNY, OR DISEASE OF THE SHOULDER.

This is an affection not uncommon, but yet little understood. If of recent occurrence, it will be seen that the shoulder is *swelled;* if of long standing, that the shoulder is *diminished in size*, the muscles having shrunk away. The shoulder is frequently shrunk when there is no disease in it: this shrinking arises from disuse of the muscles. To retain its full volume, a muscle must have constant action. Now, disuse of the muscles of the shoulder may arise from two causes: 1st, lameness of the foot or leg; 2d, lameness of the shoulder. If it arise from the foot, no treatment is necessary for the shoulder. It may be easily known if it proceeds from the foot. In such case the horse, when he moves, lifts his foot *clear from the ground;* and when he points his foot forward, he places it flat on the ground. If the injury be in the shoulder, when he moves he *drags the toe of the foot along the ground*, seemingly unable to lift it clear; when he points his foot out, his *toe* only rests on the ground, not the sole of the foot. If the injury is in the shoulder, the horse reluctantly turns his head towards the opposite shoulder: this strains the muscles; but he will willingly turn his head toward the lame shoulder, as this relaxes the muscles.

The common causes of shrinking or swinny of the shoulder, when it arises from the foot or injury to the leg below the shoulder, are all the diseases of the foot and leg, which continue long enough to occasion such a disease of the muscles of the shoulder as to occasion their shrinking. Such diseases are foot-founder, contraction of the foot, strain of the navicular joint, ringbone, pumiced foot, sand-crack, quittor, gravel, any separation of the foot; in short, any of the various diseases of the foot which induce the horse to favor it, and thus use as little as possible the whole leg and shoulder.

The shrinking of the shoulder, where it arises from an injury in the shoulder itself, has but one ordinary cause, namely, a strain of the shoulder. When there is a strain of the shoulder, it is known at once. Within a few hours after its occurrence, the shoulder is swelled, perhaps in its whole length, but generally only at the lower end. The strain lies almost always in the muscles which attach the shoulder-blade to the body; yet the swelling is on the outside, but this arises from sympathy.

When the horse is observed to be lame, and it cannot at once be determined where the lameness is, let him be walked; and if *he drag his toe*, it is in the shoulder. Let the shoulder be examined in front; if the affection be of long standing, the shoulder will be seen to be less than the other. If, on feeling it, it be found to be free of heat, there will be no fever: the disease is then chronic. If, however, the shoulder be enlarged, it will be found, on feeling, to be hot: the injury is then recent and inflammatory. Where the disease is in the shoulder, and is chronic, it has gone through the inflammatory stage, and is of some considerable standing. The chronic state is rarely cured. It is not unlike rheumatism. For the *chronic state*, the best remedy is *active blistering:* this will rouse the vessels to activity. It may be necessary to blister repeatedly; and exercise should accompany the blistering, with good grooming and general care. Let the exercise commence as soon as the blister begins to diminish its discharge. This treatment, continued judiciously and energetically for some time, may cure *chronic* disease of the shoulder. When the strain is recent, and inflammation exists, the horse should be bled from the neck, and from the plate vein on the inside of the leg, as near the body as possible. Rest, cooling physic, both purgative and sedentary, should be given: no *blistering* should be allowed. Embrocations of a cooling nature should be applied. No *stimulants* should be applied externally, or given: they but add to the inflammation. When the inflammation is subdued, and the shoulder has fallen back to its natural size, the horse needs nothing but rest, with gentle exercise. Let him be turned out, if in the summer, to grass; in the winter, into a small yard in good weather, and a loose box at night in bad weather. It will take him some time to get over the effects, and be fit for work again.

When the shoulder is shrunk or swinnied from lameness in the foot or leg, below the shoulder, no attention should be paid to the shoulder. When both feet or legs are diseased, so that the horse seeks to relieve each alternately from pressure, both shoulders will be swinnied; they will be both shrunk, and the breast in front will be diminished and fall in. The treatment in these cases is to be addressed to the place of disease. If in the feet, cure them; if in the legs, cure them. Some diseases in the feet cannot be cured; and, of course, if there be swinny from such cause, it cannot be removed. When the feet and legs are cured, and the horse recovers thereby his wonted action, the muscles of the shoulder will, by exercise, recover their former size, and the swinny be gone.

Among the ignorant there is a variety of remedies for the swinny, as pegging (that is, thrusting a knife in the shoulder, and blowing in stimulating powders), swimming, setons, etc. A recent writer in the Southern Cultivator, says, "Introduce the small blade of a common pocket knife (the point of which must be sharp), into the thinnest part of the shoulder, which will be near the upper margin of the shoulder-blade, holding the knife as you would a pen when writing, and scratch up the membrane that covers the bone for a space the size of a silver dollar; the knife may be then withdrawn. The knife may then be introduced in one or two places below the first, and used in the same way, and the operation is over." Now, if the disease be in the shoulder, this method can only cure by rousing the vessels to action. Blistering will do this better, and is more humane and less dangerous. Wounded membranes frequently produce fatal inflammation. Blistering is never dangerous in chronic affections, and therefore is preferable on that score, and by general action does far better. It is done within two days. Scraping the membrane cannot be through its operation short of weeks.

BUFFALO, January, 1845. A. STEVENS.

[From the same.]

FATTING SWINE.

ONE of the most important duties demanding the farmer's attention this month, is the fattening of his swine. The practice of some at the north is, to commence one month later; but this is very bad economy, for all animals will fat much faster in mild weather than in cold. Besides, there is a good deal of stuff about the farm which is never so valuable as in this month; and if gathered up and cooked, is the best food which can be given for the commencement of the fatting process. We would name small potatoes and roots of all kinds, cabbages, turnips, pumpkins, apples, and unripened and imperfect ears of corn. After these have been fed a month or so, commence with a mixture of the different kinds of meal, or corn alone, and shove the animals as fast as posible, getting them ready for the market by the middle of November to the first of January. If delayed longer than this last mentioned period, however cheap food may be, or high the pork may sell, fatting swine will be a losing process.

The hogs should be allowed to exercise a little in the open air, and have charcoal and rottenwood to eat twice a week, and whatever water they may wish to drink. Some contend that they will not fat as fast for this, but that remains yet to be proved by careful experiment. At any rate, we know that the meat is much superior when fatting animals have a moderate degree of exercise, and plenty of fresh air and water. If closely confined they become feverish, and their meat is not only flabby and tasteless, but positively unhealthy.

Another thing. Sufficient attention is not paid to the cleanliness of swine. Depend upon it, no animal pays better for keeping him clean than the hog; and, after all, he is not half as dirty a beast as he is usually set down to be. No creature enjoys clean quarters better than he does; tempt him with a good bed of fresh straw, and see. The following experiment was recently tried in England : Six pigs of the Norfolk breed, and of nearly equal weight, were put to keeping at the same time, and treated the same as to food and litter for about seven weeks. Three of them were left to shift for themselves as to cleanliness ; the other three were kept as clean as possible, by a man employed for the purpose, with currycomb and brush. The last consumed in seven weeks fewer peas by five bushels than the other three, yet they weighed more when killed by seventy-two pounds.

Northern farmers may talk as they please, but they don't understand, or rather carry into effect anything like so good a system of fatting swine as those do at the west. There they commence feeding early in September, in a nice grass pasture, with plenty of shade trees, and a clear stream running through it. Here Master Porkibus daily bathes his sleek sides, eats luscious roasting ears to his fill, drinks and walks about, or sleeps at his pleasure ; and the way he contrives to extract the fat from the corn to cover his rotund ribs, *is quite charming*, completely distancing any other chemical process that the wit of man has yet invented. It is worth a journey of a thousand miles, any time, to take a look at a *small* field of corn of *five hundred acres*, crowning the rich bottoms of the west on one side of a fence, and a *little* herd of *two or three hundred* lusty grunters making away with it on the other. Indeed, we speak within bounds in saying, that we have seen thousands of acres of corn stretching along these valleys, seeming at a little distance like one continued field ; and we once counted 537 hogs in one herd. Talk about pork and corn in New-York ! Take a trip to the Sciota, the Miami, and the Wabash, and one will then get his eyes open, and know something about them.

[From the same.]

INCUBATION.

In an impregnated egg, previous to the commencement of incubation, a small spot is discernible upon the yolk, composed apparently of a membranous sac or bag, containing a fluid matter, in which swims the embryo of the future chick, and seemingly connected with other vesicles around it.

1st Day. In a few hours after exposure to the proper temperature, the microscope discovers that a humid matter has formed within the limits of the embryo. At the expiration of twelve or fourteen hours, this matter bears some resemblance to the shape of a little head : a number of new vesicles also successively appear, foreshadowing the different parts of the future body of the chick ; those first formed, and most easily distinguished, may afterwards be recognized as assuming the shape of the vertebral bones of the back.

2d Day. The eyes begin to make their appearance about the thirtieth hour; and additional vessels, closely joined together, indicate the situation of the navel: the brain and spinal marrow, rudiments of the wings, and principal muscles, become observable; the formation of the head is also evidently proceeding.

3d Day. The beating of the heart is perceptible, although no blood is visible: after a few hours, however, two vesicles, containing blood, make their appearance; one forming the left ventricle, the other the great artery: the auricle of the heart is next seen, and, in the whole, pulsation is evident.

4th Day. The wings now assume a more defined shape; and the increased size of the head renders the globules containing the brain, the beak, and the front and hind part of the head, distinctly visible.

5th Day. The liver makes its appearance; and both auricles, now plainly seen, approach nearer the heart than before: that splendid phenomenon, the circulation of the blood, is now evident.

6th Day. The lungs and stomach are distinguishable, and the full gush of blood from the heart is distinctly apparent.

7th Day. The intestines, veins, and upper mandible become visible, and the brain begins to assume a distinct form.

8th Day. The beak for the first time opens, and the formation of flesh upon the breast commences.

9th Day. The deposition of matter forming the ribs takes place, and the gall-bladder is perceptible.

10th Day. The bile is distinguishable by its green color; and the first voluntary motion of the body of the chick is seen, if separated from its integuments.

11th Day. The matter forming the skull now becomes cartilaginous, and the protrusion of feathers may be noticed.

12th Day. The orbits of sight are apparent, and the ribs are perfected.

13th Day. The spleen gradually approaches to its proper position near the stomach.

14th Day. The lungs become enclosed within the breast.

15th, 16th and 17th Days. During these days, the infinity of phenomena in this wonderful piece of vital mechanism elaborate it into more perfect form, and it presents an appearance closely approaching the mature state; the yolk of the egg, however, from which it derives its nourishment, is still outside the body.

18th Day. On the eighteenth day, the outward and audible sign of developed life is apparent, by the faint piping of the chick being, for the first time, heard.

19th, 20th and 21st Days. Continually increasing in size and strength, the remainder of the yolk gradually becomes enclosed within its body; then, with uncommon power for so small and frail a being, it liberates itself from its prison in a peculiar and curious manner, by repeated efforts made with its bill, seconded by muscular exertion with its limbs, and emerges into a new existence.

The position of the chicken in the shell, is such as to occupy the least possible space. The head, which is large and heavy in proportion to the rest of the body, is placed in front of the abdomen, with its beak under the right wing : the feet are gathered up like a bird trussed for the spit ; yet in this singular manner, and apparently uncomfortable position, it is by no means cramped or confined, but performs all the necessary motions and efforts required for its liberation with the most perfect ease, and that consummate skill which instinct renders almost infallible.

The chicken, at the time it breaks the shell, is *heavier* than the whole egg was at first.

An egg will not hatch *in vacuo.*

The infinite wisdom of the Great Architect of the animal frame is remarkably manifested in its providing the chick with a sharp and hard substance on the tip of the bill, by means of which it is enabled to fracture the shell to liberate itself from its imprisonment. Its own bill is too soft to enable it to break the shell therewith ; and in two days or less, this hard and pointed substance disappears, the young bird no longer requiring to use it.

Equally extraordinary and wonderful is the fact that the germ of the chick is provided with the ability to keep itself always on the top of the yolk of the egg, to the end that it may take the heat from the parent bird when setting to produce incubation.

[From the (Chicago) Prairie Farmer.]

BREEDS OF CATTLE FOR THE WEST.

Those who advocate the adoption of any *one* particular breed of cattle for our climate and soil, seem to proceed on the supposition that a breed once established will always retain its peculiarities under every variety of situation and circumstance. Never was a greater mistake made than this. A breed of animals will most infallibly adapt itself to its food and treatment. Durham cattle, for instance, can never long be made, on the hills of New-England, to retain their size. How is it at present with Berkshire swine? It would not be out of the way to say that there will soon be an endless number of varieties, all springing from this breed, having as little resemblance to each other as to other breeds. Let us ask the question how the present distinct breeds of cattle, swine, and sheep were produced. It was by *uniform* courses of feed, treatment, and propagation. So well fixed in the breeds are certain peculiarities, by this treatment, continued for a long time, that they will resist, *for a while,* changes of circumstances ; but they cannot continue to do it. For instance, let cattle from the cold hills of Scotland be placed upon warm rich prairies, and bred in their own line for twenty generations, and then be compared with those fresh from their native region, and who does not believe that very evident changes would be produced? The mistakes which our farmers are continually making in stock-breeding, grow out of incorrect ideas in this matter. For instance, a fine breed of cattle or swine is introduced. A farmer thinks if he can only get some of that stock once on his farm, he will be made. He pays a high price for a pair of calves whose ancestors have been accustomed to a fixed course of tender treatment; having been stabled much, and fed with great care on the best of food. He turns out his calves to get what they can catch, without shelter or salt, or any thing else which this breed has been accustomed to, and he wonders that their blood does not show itself omnipotently against all these disadvantages. He notices, perhaps, that they do not thrive as well as his scrubs. The fact is, the shock of the transition is too great. Many have inferred, in this way, that the short-horns would never answer for our farms, because they cannot endure rough treatment. The short-horns have undoubtedly been more petted and tenderly treated than any other breed; but if the transition from tender to rough treatment be properly conducted, they will probably endure it as well as any other. If a man gets an animal which has been stabled all his days, and suckled till a year old; and turns him out to shirk, the animal will run down. But we are told by stock-growers that the short-horns, if once accustomed to rough treatment and coarse feed, will endure it as well as other cattle. This may be so; but they will not continue to retain the *peculiarities of short-horns*. This belief the fire will not melt out of us. To produce a uniform race of cattle, there must be uniform treatment, as well as correct breeding. An animal's body *is made of what he eats and drinks.*

Hence the great disappointment of those swine-breeders in the Southern States, who rushed into the Berkshire growing, without any reference to their mode of keeping hogs. They are accustomed much in the South to let their swine range, and get their own living by eating roots, snakes, acorns, and corn in the field. An animal, to do this, must have legs and wind. The berkshire had neither, and of course soon fell in the rear. He was as much out of his element as a horse in a singing school: he had not "the hang of that schoolhouse." He might be kept till he got it, perhaps; when he could get his living as well as others. But he would cease to be a berkshire — he would become a sharkshire. A berkshire's place is a snug clover lot in summer; a pen in winter, with good food brought to him. With these, he is himself; without them, somebody else.

Our readers will easily see the conclusion to which we come. The men who say "Give us the durhams for the West," or "Give us the ayrshires," or "the devons," without any reference to what use they are intended for, or what treatment they are to receive, have none of our sympathies.

We have but room here to notice another error, which is, in breeding. The individuals of a breed differ much. Some short-horns are no better than some no-horns or no-names. What propriety is there, then, in supposing that superior stock will be obtained from such a source. True, a poor thorough-bred animal will be more likely to produce good stock than one not thorough-bred, because the excellence of some ancestor may appear in his issue; but it is great folly to breed from a poor animal of any blood. We hear people complain that Berkshire hogs are no better than others; while others prefer them to every thing else, and with reason on both sides.

[From the Maine Cultivator.]

SOAP-SUDS — COMPOST.

This is, perhaps, one of the most powerfully fertilizing articles produced on a farm. It contains the food of plants in a state of almost perfect solution, and consequently in a condition the most easy to be appropriated and assimilated when applied as a stimulant to vegetable life. In order to avail himself of this important source of wealth, the farmer should provide himself with a tank of a size sufficient not only to contain the suds made in the family, but a large quantity of other materials, such as sods, turf, bones, ashes, straw and muck; in short any substance not actually and necessarily prejudicial to vegetation, and which may, partly by imbibing the liquid, and partly by chemical action, become an ingredient in the food of plants. The tank or cistern provided for this purpose, should be proportioned to the size of the family, and so situated as to admit of an easy approach with the cart. It should also be so constructed as to be exposed as little as possible either to the washing of heavy rains, or the influence of the sun and air. We have often been surprised, on visiting the premises and farm yards of some who have enjoyed an honorable reputation for economy in other matters, to find them cluttered and encumbered with useless rubbish, which a little time, properly devoted, would have reduced to a healthy and valuable assistant in the fertilization of a perhaps unfertile and unproductive farm. Bones, shells, chips, are all excellent ingredients in the compost heap, and will well reward any person for the trouble and expense of gathering them up. It is often the case that soil in low places by the road side, which receives the wash from the highway, may be converted into a valuable stimulant simply by throwing it into heaps. This, however, should be done in the fall, as the wash during the summer adds greatly to its stimulant powers, and the operation of the frost in winter conduces greatly to its improvement, by thoroughly breaking up and disintegrating the earthy particles composing the mass. Such soil, or indeed any other, moderately indued with fertilizing properties, and the powers of imbibing and retaining moisture, may be greatly increased in value by being placed in a situation where it will remain open to the action of rain and the elastic gases.

[From the (Philadelphia) Farmer's Cabinet.]

MANAGEMENT OF HENS.

FROM THE STATEMENT OF JAMES L. CHILD:

MY hens laid nearly as well during the winter as in the warm weather. Their habitation was warm, and so constructed as to bring them to the ground, where they found at all times a good supply of old plastering, ashes, pulverized oyster shells, charcoal, fresh water, beef liver once or twice a week, or some other kind of meat. I feed chiefly upon baked or boiled potatoes, giving their food to them warm in the morning and at night, occasionally dealing to them a little corn or oats, and giving them all the crumbs, and skins, and fragments of the cooked vegetables. To prevent their being infested with lice, about once a fortnight I mixed in dough, so as to discolor it, a quantity of flour of brimstone, which is a sure preventive as well as remedy, and may be safely given in small quantities to young chickens for the same purpose.

It will be seen from my mode of keeping my hens, which average about twenty-five and three roosters, through the winter, that I can not give the precise cost of keeping; but I am satisfied that potatoes may be given as a general food, and fowls kept cheaper in this mode than in any other, and they will always be ready for the spit, if not stinted in quantity. I find my fowls fat at all seasons.

I estimate that my hens afford me from their eggs, without regard to their meat, a clear profit of 50 per cent. I confine them to their yard, hen-house, and barn cellar, during gardening, and to their house and cellar in the winter; and think, with that degree of confinement, they lay better than they do when allowed to wander at large. Hen-houses and roosts should be kept neat, and often whitewashed; and their nests should always have half an inch or more of ashes or lime on the bottom, under the hay. Broken or rotten eggs should never be allowed to remain in the nests. Dirty water should not be given them. To do well, they require pure water, and all their food fresh and uninjured from taint or fermentation. I estimate that during the year (deducting the time of their moulting, and inclination to set), I have got daily one half as many eggs as I have had laying hens.

Every family can, with a very little trouble, with their flock of a dozen hens, have fresh eggs in plenty during the whole year, say in all 2000, and 100 full grown chickens; and of all the animals domesticated for the use of man — if such be the fact — the hen is capable of yielding the greatest profit to the owner. It is a pleasant recreation to feed and tend a bevy of laying hens.

Care should be taken to change roosters often, as otherwise the best variety in the world will run out, and cease to be profitable from breeding in and in; and I feel great confidence that much improvement may be made by due attention to crossing, and in this way some of the evils from breeding be averted. I have stated that

I give my fowls meat: this is indispensable, if they are not allowed to go at large. If corn is fed out, it should be soaked, and fifteen bushels is a fair yearly allowance for twelve hens and a rooster. But they should always have food by them, and after they have become habituated to find enough at all times in the trough, they take but a few kernels at a time, except just before retiring to roost, when they will take nearly a spoonful into their crops; but if they are scantily or irregularly fed, they will greedily snatch up a whole crop full at a time, and stop laying, and not unfequently engender some fatal disease.

[From the same.]

PREPARATION OF SEED.

Mr. Editor — I do not know any subject in the whole range of agricultural pursuits, upon which labor can be so profitably bestowed as in the preparation of seed. It is lamentable to observe the immense loss which is continually sustained in consequence of indifference and carelessness on this point; and it is really to be feared that every species of grain will continue to degenerate in quality and diminish in quantity, unless the farmer is awakened to a proper sense of the importance which he should attach to this part of his business. It has been the observation of almost every man, that those products of the farm which are less valuable, and which, therefore, the farmer is more indifferent about, are annually growing worse in quality. Oats are lighter in the grain and upon the ground than they were formerly; and rye is becoming so exceedingly bad in quality, and so uncertain a crop, as to be scarcely worth committing to the ground. Farmers are heard constantly to express their wonder why the product of the rye crop is not as it was formerly, and that they can not raise as much oats to the acre as they used to do; but they will cease to wonder, if they will but reflect how exceedingly indifferent they have been with regard to the quality of the seed which they have used. The importance and value of the wheat and corn crops, have sometimes induced them to make an exertion to procure better seed than their own; but who ever takes the trouble to go beyond his own granaries, to seek for seed rye or oats? Or who ever takes more pains in its preparation, than to measure it into his bags from the pile, as it comes from the barn floor? To this alone is attributable the fact that these crops make but a scanty return for the labour bestowed upon them. I do not urge the recollection of these things for the sake of these crops, for I do not deem them essential to the farming interest, beyond the small amount of them which the farmer may be supposed to require for his own immediate consumption; but the same reasons and principles precisely are applicable to wheat and corn, to which we attach so much importance. If, in the preparation of seed wheat, we take the grain as it is prepared for grinding, and run it through the wind-mill at a speed which will blow one-fourth or one-third of it out, and with this, nearly all the weed and grass-seeds; then run it through the rolling screen, and thus separate any cockle, weed, or cheat seed, which may remain; then wash it, and if there has been any smut in it, wash it again in salt water, and spread it upon the barn floor and sift lime upon it and mix it, I will venture to assert, that in any soil, the product will be increased from 15 to 20 per cent over what it would have been, if the wheat had been sown without this preparation. If this be so, what labor and pains so profitably spent? And that it is so, is not only constantly taught us by experience, but is perfectly consistent with those reasons which are so familiar to us all. Cheat, cockle, rag-weed and smut, are principally what infest the wheat field. Where weeds grow, they occupy the place of wheat, and take that nourishment from the ground which the wheat should have; and I need not use any argument to prove that they will not grow unless the seed is in the ground, and that it will not be there — at least in such quantities — unless it be put there. Indeed I know from experience, that in the course of a few years these weeds will be wholly exterminated by that strict attention to the cleansing of seed which is here recommended. Smut is but an infectious disease of the grain, and is common to wheat, corn and oats; but no one need have it in either, if he will but take the trouble to cleanse his seed. For several successive years have I made the experiment of cleansing smutted wheat, by washing a small portion of it in salt water and putting lime upon it, and venture the assertion that it will never fail to purify it. I have also taken pure wheat and mixed smut with it, and thus communicated the disease, and it will never fail to produce smutted wheat. The same remark may be made with regard to oats and corn; for the blighted head of oats, and the large black excrescence which sometimes grows upon corn, although different in appearance, are essentially the same thing.

It is a very common impression that wheat is improved by changing it from one kind of soil to another. It may be so; and if "what every body says must be true," it is so: but I may be permitted to doubt it, if it be only for the purpose of inducing thought and observation on this point. Each one of your readers is prepared to say, "I know this from experience; but, notwithstanding, it is still worth the inquiry, whether his experience is not this, that when he went from home after seed, he went after *good* seed, better than his own, which he sowed in the next field, and cultivated in the same way, and upon which his observation induced him to come to the conclusion, that the seed he got from the slate land produced better than his own? I am not prepared to enlist myself upon the one or the other side of this question.

Seed corn should be selected while it is upon the stalk; it can not be so well done afterwards. Every one has observed how much sooner some ears of corn in the same field ripen than others, and that some stalks bear two and some three ears, while others have but one. All analogies and experience teach the advantages which are derived from the selection of those ears which possess these advantages. The same reason which would induce us to select a good breed of hogs, is equally applicable to our corn and wheat. The farmer who will turn his attention to a proper selection and preparation of his seed, will be much suprised how little labour will produce a great result. W.

CARLISLE, March 17, 1845.

[From the same.]

TO MAKE GOOD BUTTER.

MR. EDITOR — There is nothing requires more care than the making of good butter, and nothing is more wholesome when it is good. Aware of this, I found that strict attention, care and perseverance on my part, were ultimately crowned with success. Good butter ought to be made in winter, as at any other time. The heat of summer is as hard to contend with as the cold of winter ; and this convinced me that there was a certain degree of heat more favorable than another : this, after many trials with the thermometer, I thought to be about 60°. I will relate to you some of my discoveries and observations, which no doubt will seem rather stale among so many good butter-makers ; but let me premise that these were in my own dairy, and under peculiar circumstances.

First objection : The milk was often left too long standing in the bucket, before strained and put away. I think the sooner it is put away the better, and should not be disturbed while the cream is rising.

Second objection : The milk pans, of stone ware, were never warmed, but frequently taken from the shelf out of door, and the milk, already cooled by standing, strained into the almost freezing pans ; the consequence was, the too chilled milk would stand a long time without casting its cream ; and being skimmed at regular intervals, we fell short of the proper quantity of that necessary article, and of butter.

Third objection : The skimming process was not carefully done ; too much milk, and in the summer too much "clobber," clopper, or "clabbaugh," or whatever it may be called, is thrown in with the cream, which, in summer, gave a rancidity to the churning, creating a difficulty, and sometimes entirely preventing the gathering of the butter, and in the winter filling the churn to no purpose.

Fourth objection : Inattention while churning ; leaving the churn after having commenced ; stopping, as they would say, to rest ; not regular enough in turning : we use a barrel churn. All these things tend to prevent the coming of the butter in a proper time, and long churning tends to deteriorate the quality. I found, too, that after the butter *had* come, instead of moving the paddles slower to allow it to gather, they continued the same quick movement, keeping up and even raising the temperature till it melted, or went back, as one of my women told me: Hence you perceive the necessity of close attention in churning. Beginning with a good velocity, and continuing the same motion till a little pressure is felt on the handle, which signifies the approach to butter; and then decrease the motion gradually till the butter begins to gather or break, when a few turns backward and foward will end the process. Now if the cream was good and sweet, churned properly, and has come in 15 or 20 minutes, I will warrant good butter so far. But it is as often spoiled after taken from the churn, as before.

The best temperature for the *whole* process of the dairy is, as I have before stated, between 60 and 65°; the latter, perhaps, the best. This winter I brought my milk to the house, and appropriated a closet to it in a room where I have kept the temperature to an average rate of 60°. The past winter, however, has been very mild, and during some of the warm days I observed the milk turned within twenty-four hours; during which time I leave the milk to cream. My observations after taking the butter from the churn, and objections, were these:

First objection: They would leave the butter too long after churning, in the butter-milk. I think, as soon as the vessels for working it can be made ready, it is best to take it out and rinse it off in strained water, and then commence the working; do not let the vessels be too warm — nay cool.

Second objection: Working by hand, the short scoop paddle being the neatest and the best. Working does not mean paddling it over and over, but means pressure; and when carefully done, two or three times working over by small parcels, will be quite sufficient; the best evidence of a sufficient working, however, is the purity of the water with which it is washed: when it runs clear as a bell, then stop. Salt to the taste next, is a safe recommendation; but I put in half an ounce to every pound, which seems to be best suited to the taste of *my* customers The common Liverpool salt, free from motes and rolled very fine, is the kind I use. I would recommend *now* a sufficient paddling over to mix the salt well; and after standing an hour or half hour, cut it in half pound prints, and observe if it be streaky, which is occasioned I think by the salt abstracting the coloring matter of the butter: work over each print by itself, and then if the butter is not fit for any table, I'll give up.

Yours truly. F. H.

BALTIMORE, March 28, 1845.

[From the Boston Cultivator.]

ON THE RAISING OF PEACHES.

PROCURING HARDY VARIETIES.

Last week we made some general remarks on raising peaches, in New England. This can only be done with success by a choice collection adapted to this climate. The first thing is to get good seed, whether you intend to raise natural fruit, or raise selected kinds by budding. The most hardy and durable trees are those raised from seed, without budding. Select seed from hardy trees and good bearers, that produce good sized handsome fruit of an excellent quality: prefer those from natural trees, that is, such as have never been budded or grafted. Then you will generally get the same excellent fruit as that from which the seed is taken; and if you bud, it is but to get hardy stocks. It may be well to plant seed from some highly valuable budded varieties, in order to get new kinds.

In almost every section of the country, where any attention has been paid to the cultivation of this fruit, excellent kinds of natural growth can be obtained. We collected seeds from a number of superior varieties last fall, from which we now have trees. We found five excellent sorts of natural fruit, in the distance of seven or eight miles.

By all means avoid southern trees, seeds, and buds for grafting; as a large list of highly valuable varieties can be found in this northern region, which have been acclimated, and, with a judicious selection, may be found free from disease, constitutional or incidental. We have long recommended the use of northern seeds either for trees or stocks, and have refused southern peach stones when offered as a gift, and paid a high price for those grown in the north. Too many trees grown in this section are from southern fruit; hence, in a measure, the destruction of trees by cold winters.

One cultivator who has had much experience, informs us that he used to save carefully every peach tree that came up under his trees of excellent budded fruit; but he found such stocks soft, short-lived, and liable to be winter-killed: he now digs up such trees as he would a weed, and late in the fall, he looks out for some peaches from old, long-lived, natural trees, and from these he takes seeds to form stocks, and though they may not grow so rapidly, they will be firm, hard and durable. This is what we advised some years ago, as we had learned from experience and observation.

In getting trees or seeds from the south, besides the disadvantages we have named, we are liable to introduce the yellows and other diseases. We have seen some peach trees, of natural growth, that were over thirty years old, and yet produced good fruit. The seeds of such old standards that have braved the blasts of many winters, are highly valuable.

After obtaining the stones, it is not material whether they be immediately buried, or continue dry a few months ; but before the ground freezes, bury them ten or twelve inches in sandy soil, and there let them remain till spring, and the ground is dry, ploughed, and prepared ; then carefully crack the stones, and plant the seed about as deep as you would corn, and they are about as sure to grow.

[From the same.]

PROPAGATION OF FRUIT TREES.

Messrs. Editors — Being considerably engaged in the cultivation of fruit trees, it may not be uninteresting to the readers of your valuable paper to become acquainted with the different modes of management in the rearing of nurseries. In the commencement of a nursery, too much care cannot be taken in the choice of seed ; no seed should be sown, except those procured from large matured fruit. Such selected seed seldom fail of producing thrifty plants. Apple and pear seeds should not be sown till spring ; as in autumn sowing, the soil becomes so hard as to cause the plants to come up in a crooked, deformed state. The following mode I have practised for several years with the greatest success. Seed should be sown in beds after the mode of common garden seed. When they are of sufficient size to engraft, they may be taken from the seed bed, their tap roots shortened, and transplanted into a rich loamy soil, in rows four feet apart, and twelve or eighteen inches distant from each other. When this is properly done, they may be grafted close to the ground, after the mode of whip or splice grafting. This mode is practised mostly on small stocks, and succeeds best when the scion and stock are of an equal size.

The scion, which consists of the young wood of the former year's growth, is cut to the length of about four inches. This and the stock are each to be cut in a sloping manner for an inch and a half, and tongued. Tonguing consists in cutting a transverse slit in the middle of the slope of the stock downward, and a corresponding slope in the scion upwards. Both are now to be nicely put together, so that one of the sides at least, if not both, shall exactly meet ; and to be carefully bound together with a string of cotton wick yarn, previously dipped into a composition of soft, melted, grafting wax. As soon as the scion and stock are firmly united, the string should be carefully removed to prevent girdling.

The scion to be applied should contain three buds, which will throw out as many small shoots or branches the first season. When the two lower branches are of sufficient length, they may be trained in such a manner as to form two perfect and natural trees, while the top branch forms another tree upon the stock. This mode consists in bending down the two lower branches in the form of a knee or layer, four inches below the soil, leaving the extreme ends out of the ground in a perpendicular position. The knee or bend must be so short as to always crack the bark just below an eye. By this process roots will soon form from the bended part, which will in a few months be sufficient to support the trees. They may then be severed from the parent scion, and transplanted to any other part of the nursery. This mode of proceeding supersedes the necessity of grafting ever afterwards, except when any other varieties are wanted, in which case grafting may be done on trees produced in this way. Trees propagated by layers are much more durable, and are not so liable to defect as grafted ones. S. S. DIMOND.

MERIDEN (New-Hampshire), February 2, 1845.

[From the same.]

CULTIVATION OF CRANBERRIES.

IN answer to the inquiries of a subscriber on this subject, we will remark as we have often before, that the cultivation of this plant is not yet reduced to any regular system. They come into some lands and disappear in others unexpectedly and unaccountably, unless it be owing to a rotation of crops by nature, as oaks succeed pines, and the reverse.

If the land be not naturally wet, it is best to prepare for flowing, and there is sometimes an advantage in flowing very wet lands. The water is a protection against severe cold in winter; and by flowing late in the spring, the blossoming may be retarded until the frosty season has passed; and if flowing can be effected rapidly, it may be done any time in summer, when there are indications of a frost.

As to the preparation of the soil, if it be naturally too dry, mud will improve its texture, by rendering it more retentive of moisture; and if the land be naturally wet, and the soil composed mostly of mud or peat, sand will be a good manure. When land has been long in grass, and cranberries have not grown, the cranberry plants would be likely to displace the grasses, aided by the tendency of nature to rotation; but if the ground has been in cranberry vines, and they have disappeared, the land should be ploughed, or in some way inverted, burying the grass completely, and tolerably deep.

In transplanting, take up shovelfuls of the soil at places about four feet apart; and place in the holes shovelfuls of earth taken from a cranberry bog, with the vines therein, and they will soon run and occupy the whole ground.

MISCELLANIES.

THE ZEUGLODON CETOIDES (OWEN).

In our July number, we figured and described the teeth of the *Zeuglodon cetoides* of Owen, with the intention of proceeding with the descriptions of other parts as we have prepared them, or as we have disclosed them by the removal of the matrix. Our space is now entirely occupied with other matters, and we therefore transfer that subject to our first number for 1846. We, however, take this opportunity to notice Mr. Koch's specimen, which has been put up in New-York. It is undoubtedly made up in part, and put up erroneously. Thus the paddles are the cast of a chambered shell. A portion of the skeleton, placed for the head, is probably a part of the pelvis, and the lower jaw is extremely defective; and to ensure a wonderful animal, parts of two or more skeletons seem to have been put together. It is called a Sea-serpent; but every part of the skeleton shows that it is not a serpent or a lizard, as both these families have vertebræ with a ball and socket joint. The paddles which are affixed show that the owner has but a scanty knowledge of comparative anatomy, inasmuch as they have not the slightest analogy to those structures as they are found in nature.

Our skeleton has the base of the lower jaw; the anterior terminal portions of both jaws, with teeth; a portion of a scapula, with the heads of the humerus; an entire humerus; a perfect femur; a distinct portion of a forearm, radius and ulna; a portion of a pelvis, with about seventy feet of vertebra, which were found in a line together, and numbered as they were removed from the rock. The neck is evidently long, and comparatively slender and serpentine; yet the jaw and other bones prove it a mammiferous animal.

We informed Mr. Koch that his paddles were parts of a chambered shell; and that the bone which he called the head, was a part of the pelvis. We make these remarks, not with a view of diminishing the value of Mr. K.'s specimen: what we wish, is that this remarkable relic should be properly put up, and every thing removed which does not belong to it.

AMMONIA DESTRUCTIVE TO INSECTS.

Mr. Jordan, of Brooklyn, having a fine large peach tree decaying, tried unsuccessfully various means, till at last it occurred to him that carbonate of ammonia might prove useful. He immediately inserted small pieces of this substance in the holes made by the insects in the trunk of the tree. The result was the destruction of the insects, and the entire resuscitation of the tree, so that it bare a remarkable quantity of fine fruit this season. The remedy is perfectly rational, and we have no doubt it will prove invaluable.

NATIVE LAMELLAR IRON.

We have in our possession a mass of native lamellar iron, which is quite remarkable. The laminæ are about $\frac{1}{36}$th of an inch thick, and columnar. Sp. gr. 6·58, from one trial of a thin plate. At first we supposed it an artificial production, but we were soon satisfied this opinion was incorrect. It dissolves rapidly and perfectly in warm sulphuric or muriatic acid, disengaging hydrogen. Ammonia precipitates the peroxide. It is attracted strongly by the magnet : streak and lustre metallic. But its laminæ are only slightly flexible, and it is entirely destitute of malleability. On being heated, it is converted into the black oxide ; and we were entirely unable to flatten it under the hammer when red hot, although it is apparently pure iron. We submitted a specimen to the examination of Dr. **Beck**, with the results we had previously obtained. We hope he will give it a thorough examination, for we consider it one of the most curious and interesting varieties of iron that has ever fallen under our notice.

OXIDE OF COPPER.

Fine octahedral oxide of copper, associated with native copper, has been put into our hands by Dr. **Eights** : it was taken from one of the Lake Superior mines. This variety is rare, we understand, in the copper region.

VEINS OF HEMATITE.

We discovered, last July, in Adams (Massachusetts), veins of this substance in the granular quartz. They are in connection with that curious mass of quartz breccia which lies adjacent to the base of the Green mountains. It has been an interesting inquiry, how the granular quartz was broken into those sharp angular pieces. It now appears to us that the sudden application of heat may have shivered entire strata, accompanied by an ejection of melted oxide which flowed into the broken mass and cemented it together. Whether so or not, we were much gratified with having discovered that the hematite of the Taconic system exists in veins in connection with the breccia spoken of above.

CONGLOMERATE OF THE GRANULAR QUARTZ.

Beds of conglomerate exist also at the base and upon the tops of the Green mountain range, which may be traced within a few feet of granitic beds. Thus upon the top of Oak hill, two miles and a half northeast of Williams College, this interesting mass is well developed. This fact establishes what we have long contended for, namely, that the granular quartz should be separated from the Gneiss and Mica slate systems, or from the Primary system.

[From the Edinburgh Journal.]

A FARM CULTIVATED BY THE INSANE.

In our former notices of the systems employed in France for the amelioration and cure of insanity, we pointed out that the occupation of the patient in various useful employments was amongst the most successful modes of treatment. When the increase of patients in the two asylums, the Bicêtre and the Salpétrière at Paris, demanded further accommodation, the unfortunate inmates were employed to assist in the new buildings; and with results extremely favorable to themselves. When these works were finished, the medical directors of the hospital dreaded the effects of a relapse into inactivity on their patients, and employed them in the fields and grounds adjoining the two edifices. So active were the laborers, and so delighted with their work, that they did everything which could be done in a very short time, and want of work was again threatened. To avert it altogether, M. Ferrus, one of the physicians of the Bicêtre, conceived the idea of obtaining a farm for the permanent employment of his willing laborers. With this view he applied to the government; but as there were no funds at the disposal of the ministry, which could be applied to the commencement of such an undertaking, and as every acre of cultivated ground near Paris was of course occupied, his scheme seemed at first hopeless. Still the benevolent projector was not to be daunted, and as he could not find a cultivated spot of ground fit for his purpose, he looked out for a barren one.

After many inquiries and surveys, M. Ferrus fixed upon an estate situated about two miles from Bicêtre, near the *Barrière de la santé*. It was the most wretched piece of ground imaginable. So entirely was it covered with stones, that there was not an acre in the whole tract which seemed capable of being successfully cultivated; and though formerly occupied by enterprising farmers, it had long been abandoned. A homestead which they had built was in ruins, and the barns and sheds in the last stage of decay. Upon this unpromising farm M. Ferrus fixed; and by the end of 1832, several of the Bicêtre patients were set to work to enclose about ten acres of the least barren portion. This enclosure was levelled with such success, that its first year's produce was sold for about £57, nearly ten pounds more than the annual rent of the entire farm. Encouraged by this result, M. Ferrus applied to the *admistration des hospiteaux* to have the patients transferred from the Bicêtre altogether, that they might live entirely on the farm. The ruined house, and the want of funds at head-quarters applicable to its repair, seemed at first powerful objections to this measure; but M. Ferrus, having good workmen at his command, overcame them. He got the government to supply tools, as it had previously done for the farming operations; the homestead was soon put in a habitable state by those for whose occupation it was designed, and, in 1835, was tenanted by a number of the insane. The farm is now regularly organized; an experienced agriculturist, M. Beguin, was engaged to direct and superintend the operations of the laborers; the whole land belonging to the estate was taken into the original enclosure, and each succeeding year has been crowned with not only an increase of agricultural produce, but with an increase in the list of cures amongst the patients. The only inconvenience the managers of the farm have to contend with, arises from an accidental want of employment which may happen. So anxious are the majority of the unfortunates for work, that they become troublesome when they do not obtain it. This was most felt in the winter, when farming operations are for a time suspended; but to fill up this blank space, the farmers at St. Anne are annually set to bleach the whole of the linen used in the two hospitals; a task which they perform cheerfully and well, saving to those establishments upwards of four hundred pounds per annum.

Besides the excellent effects which have been produced on those patients employed and residing on the St. Anne farm, it has been found of the utmost benefit to less convalescent inmates of the insane hospitals. By allowing them at first to see the others at work, they soon get a desire to join in it, which, when the medical officers deem them well enough, they are allowed to do. In short the effects of such healthful employment as that necessary to the culture of land, has been found of the utmost benefit to all classes of insane patients. The success of the French farm will, we trust, encourage the directors of our native lunatic asylums to adopt similar methods of cure; which, properly managed, appear to be as profitable as they are efficacious.

THE YOUNG PHILOSOPHER.

Children, says Professor Olmsted of Yale College, in the preface to his Rudiments of Natural Philosophy and Astronomy, are naturally fond of inquiring into the cause of things. We may even go farther, and say that they begin from infancy to interrogate nature in the only true and successful mode — that of experiment and observation. With the taper, which first fixes the gaze of the infant eye, the child commences his observations on heat and light. With throwing from him his playthings, to the great perplexity of his nurse, he begins his experiments in mechanics, and pursues them successively as he advances in age, studying the laws of projectiles and of rotary motion in the arrow and the hoop, of hydrostatics in the dam and the water-wheel, pneumatics in the windmill and the kite. I have in my possession an amusing and well executed engraving representing a family scene, where a young urchin had cut open the bellows to find the wind. His little brother is looking over his shoulder with innocent and intense curiosity, while the angry mother stands behind with uplifted rod, and a countenance which bespeaks the woe that impends over the young philosopher. A more judicious parent would have gently reproved the error ; a more enlightend parent might have hailed the omen as indicating a Newton in disguise.

MORAL POWER OF A KIND SPIRIT.

One of the most pleasing acquirements that adorn mankind, is affability. This one virtue calls into action many others, which, were it not for its influence, would probably be dormant. But of itself in its own intrinsic worth, it assuredly is the certain avenue of success in gaining the esteem and respect of others. Man's chief aim through this transitory life is happiness ; and the safest and shortest method to obtain this blessing, is by the strict cultivation of amiability of manners and softness of temper. How frequently do we hear the morose and sullen acknowledge that in their intercourse with man, an impression exists that they had dealt with a gentleman, because he was amiable and gentle ; and yet it does not follow that every one who shows forth this amiableness is a gentleman, but he can be no gentleman who does not possess it. In all walks of society, this gentleness of temper and of conduct sheds its beloved influence upon those with whom it comes in contact ; for the truth of Holy Writ assures us that a "soft answer turneth away wrath :" and where, I would ask, is that being, young or old, that hath not experienced this truth ? And does not this gentleness of temper ensure to their heart calmness of mind, and with it does it not command the respect of others ? This is undeniable ; for, gentle reader, have you not heard the remark of the ungoverned, "I could not say another angry word to him, he was so mild, so gentle in his speech and manners." Oh how insignificant does such an acknowledgment make the morose appear in comparison with this heaven-like ascendancy over our faults !

[From the New-York Express.]

THE FREED BIRD.

Among the superstitions of the Senecas, is one which, for its singular beauty, is already well known. When a maiden dies, they imprison a young bird until it first begins to try its powers of song; and then loading it with kisses and caresses, they loose its bonds over the grave, in the belief that it will not fold its wing or close its eye until it has flown to the spirit land, and delivered its precious burden of affection to the "loved and lost." It is not unfrequent, says the Indian history, "to see twenty or thirty birds loosened at once over one grave."

We find the following beautiful stanzas, founded on this legend, in an exchange paper. It is true poetry, and for such we have always a welcome and a corner.

Speed away! Speed on the errand of light!
There's a young heart awaiting thy coming to-night:
She will fondle thee close; she will ask for the loved,
Who pine upon earth since the "Day-Star" has roved:
She will ask if we miss her — so long is her stay.
Speed away! speed away!

Wilt thou tell her, bright songster, the old chief is alone;
That he sits all the day by his cheerless hearthstone;
That his tomahawk lies all unnoted the while,
And his thin lips wreathe ever in one sunless smile:
That the old chieftain mourns her, and why will he stay?
Speed away! speed away!

And, oh! wilt thou tell her, blest bird on the wing,
That her mother hath never a song to sing;
That she standeth alone in the still quiet night,
And her fond heart goes forth for the being of light
Who had slept in her bosom, but would not stay.
Speed away! speed away!

Go, bird of the silver wing, fetterless now:
Stoop not thy bright pinion on yon mountain's brow;
But hie thee away, o'er rock, river and glen,
And find our young "Day-Star" ere night close again.
Up! onward! let nothing thy mission delay!
Speed away! speed away!

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DESCRIPTION OF THE PLATES.

PLATE IV.

Exhibits the osteology of the Mastodon entire, with the tusks as found on the same skeleton.

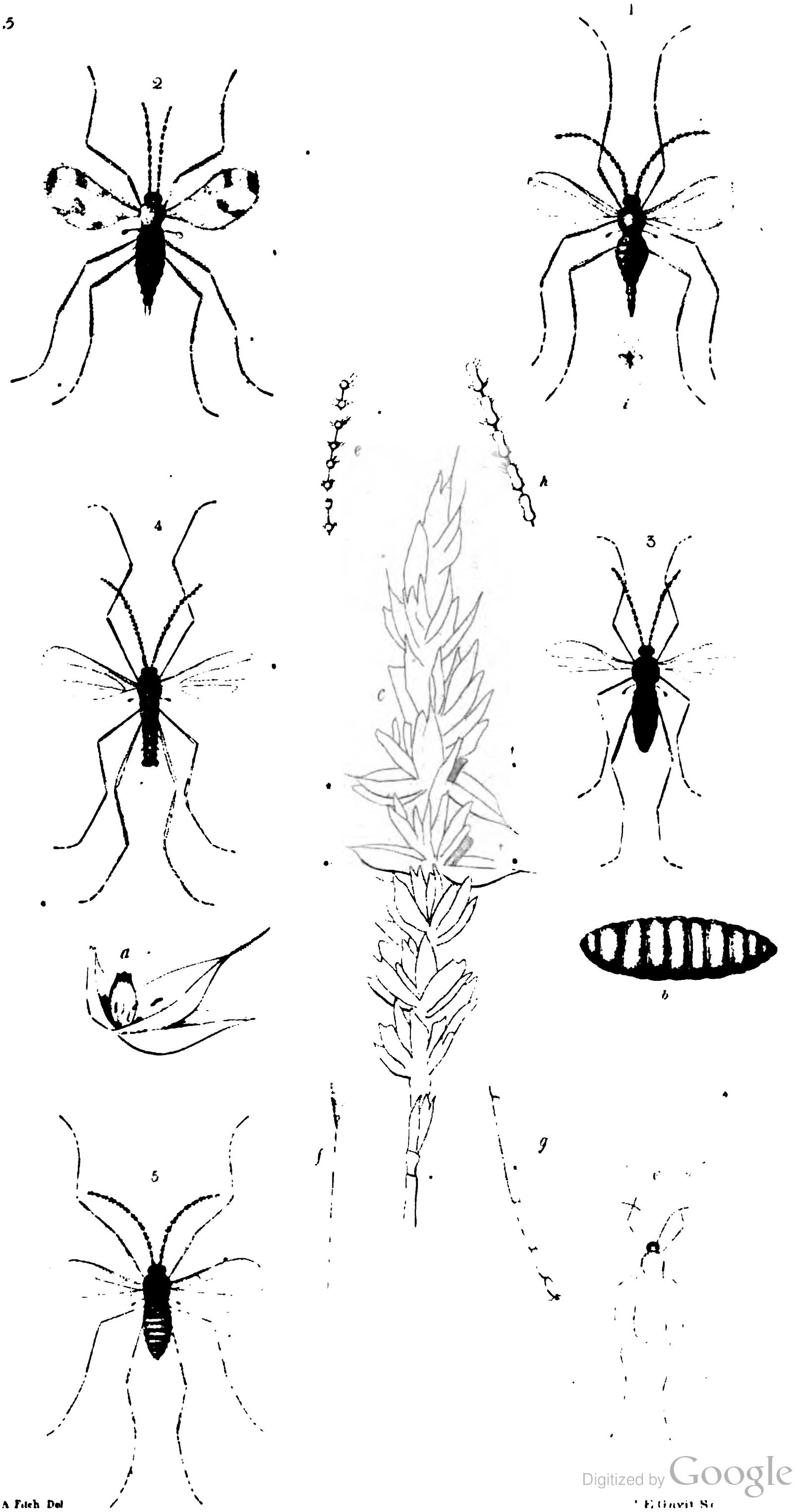
PLATE V.

WHEAT INSECTS, AND THEIR ANATOMY.

Fig. *a.* Kernel of wheat, with its husks, and the worms feeding upon its pulp.
Fig. *b.* Pupa greatly magnified.
Fig. *c.* Wheat-head, with the chaff bent down by the yellow-bird, in getting at the worms leaving the grain, as at * * *.
Fig. *e.* Male antenna.
Fig. *f.* Ovipositor when drawn out, with three segments of the abdomen.
Fig. *g.* Leg of the insect, showing its joints, greatly magnified.
Fig. *h.* Female antenna magnified.
Fig. *i.* Insect in its natural size.

Fig. 1. Clear-winged wheat-fly.
Fig. 2. Spotted-winged wheat-fly.
Fig. 3. *Cecidomyia tergata.*
Fig. 4. Male of the Clear-winged wheat-fly.
Fig. 5. *Cecidomyia thoracica.*
Fig. 6. Insect at rest, with its wings in their natural position.

Plate 5



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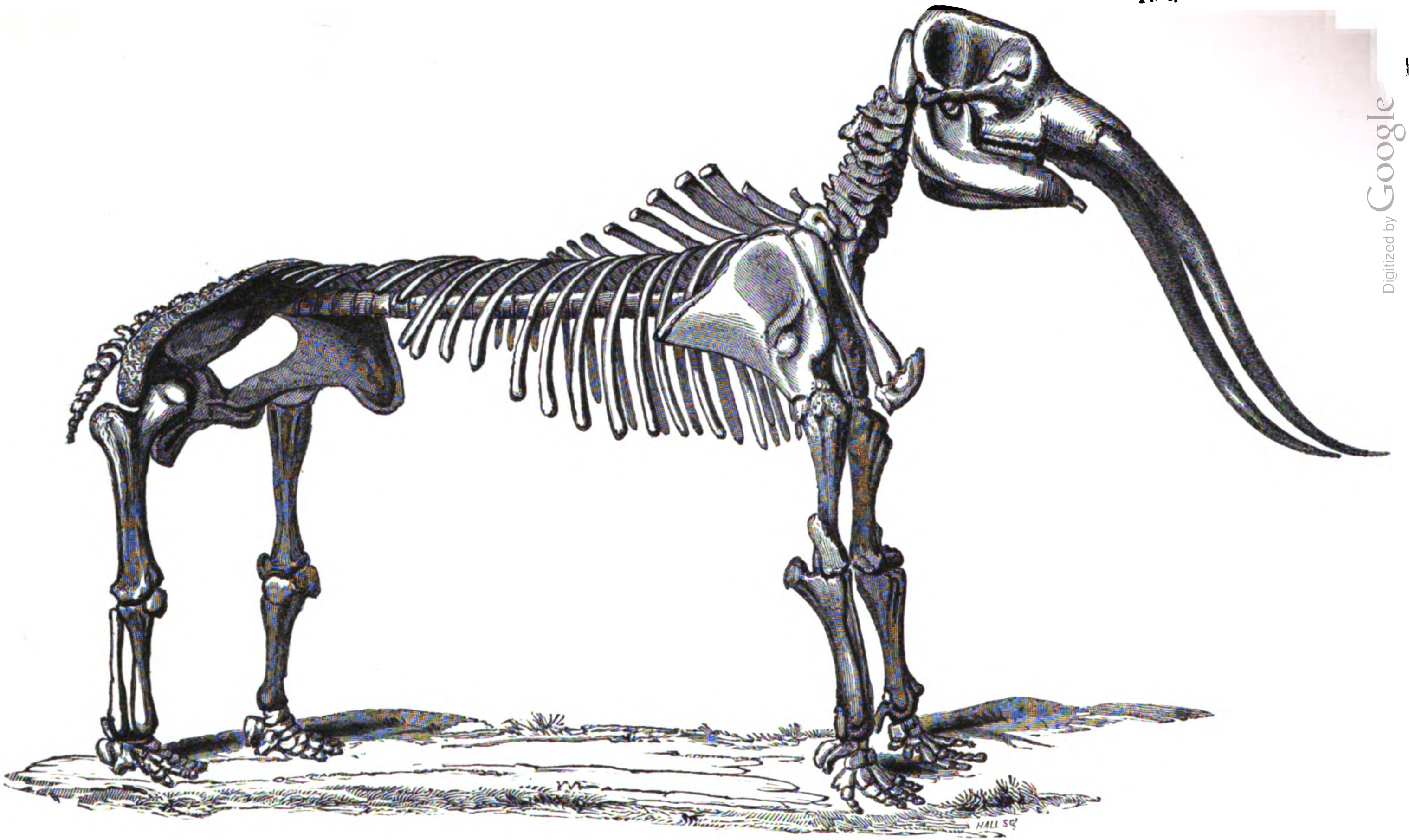

THE AMERICAN MASTODON.